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AUTHOR	Grosch, Audrey N., Comp.
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ABSTRACT

The methodologies and costs of converting the Minnesota Union List of Serials (MULS) to the National Serials Data Program (NSDP) requirements are outlined in this document. The conversion is considered under four logical areas: 1) providing quantitative estimates of the amount of computer analysis and programing manpower required to perform a machine conversion of the MULS into the NSDP record format; 2) providing estimates of the kinds, amounts, and sources of the data and amount of professional and subprofessional effort needed to bring the machine converted file into full NSDP specification; 3) providing quantitative estimates of the personnel and processing costs required to produce aperture card surrogates for all titles and the machine-converted file; and 4) studying the feasibility of and developing computer procedures for automated matching of records from the MULS and NST files for the purpose of transfer of ISSN and other data elements from the NST to the MULS file; and providing quantitative estimates of computer analysis and programing time required to implement the various procedures. (CH)

CONTENTS

Preface

The Minnesota Union List of Serials (MULS) is a serials bibliographic system which currently serves as a Union Catalog for serial holdings in Minnesota. Its programming system makes possible the production of a published catalog employing the Library of Congress MARC character set and utilizing a data base in a MARC compatible format called the MULS-MARC format. Its subject coverage of serials varies widely, as academic, research, public, and state governmental special libraries are included. Over 100 separate libraries in the state of Minnesota, with substantive holdings in the liberal and fine arts, pure and applied sciences, law, and religion, have listed their entire serials holdings. The appendix includes a detailed profile of the MULS data base.

The work accomplished under this contract (LC-1022) has been made possible through the efforts of the staff of the MULS Project and the Systems Division at the University and also on the part of the staff of the National Serials Data Program at the Library of Congress. Mr. Don Norris of the Systems Division provided basic data and estimates of costs for the machine conversion area. Ms. Lois Upham of the MULS Project provided the information needed to develop the editorial area as well as an actual review of the other areas of the study. Mr. Ray Bohling, Assistant Director for Administration, provided liasion with others concerned with serials in the library and offered critical appraisal of the findings. Mr. Glenn Brudvig, Assistant Director for Research and Development served as overall coordinator of the project group, presided over our frequent meetings, and provided a broad critical review of the work as it was reported. Ms. Audrey Grosch, Project Officer, developed the methodologies and compiled this final report.

Mr. Joe Price and Mr. Paul Vassallo of the National Serials Data Program provided considerable documentation on the NSDP system, answered questions and provided advice in our work under this contract. Moreover, others on their staff also provided answers to specific cataloging problems on actual records which we provided to see how NSDP would handle complex bibliographic problems. This information will continue to be of benefit to the MULS system as it becomes more compatible to both NSDP and MARC standards.

Benefits of MULS Conversion to NSDP Requirements

This report outlines the methodologies and costs to convert MULS to full NSDP requirements. The benefits of the conversion would be as follows:

- At a minimum, a machine conversion of MULS would significantly enlarge the NSDP data base for a relatively modest investment.
- An enlarged NSDP data base would help to unify serials bibliographic control to the benefit of all libraries.
- If the size and coverage of the NSDP data base were increased, serials data in either published or machine readable form could become more readily and rapidly available.
- A machine conversion of the MULS file which would be as complete as possible would provide satisfactory information for most titles and save on costs.
- Serials data files which are based on L.C. MARC defined fields and values can provide the basic information required by NSDP to which key-titles and ISSN may be assigned at a more reasonable cost than original cataloging and re-keyboarding of each title.

Summary of Work and Costs

In the feasibility study, we considered each logical area of the conversion problem, first the use of the computer as a tool for conversion, next the human effort necessary to perform editorial/cataloging tasks, third the task of providing title page/masthead aperture card surrogates for the converted file, and finally the use of New Serial Titles machine readable data by the Minnesota Union List System.

To develop cost data for each portion of the study, it is necessary to develop a statement of the problem together with a suggested methodology for handling the tasks comprising the area. From the methodology selected it is possible to determine the human material resources required. When dollar values are computed for these resources we have the establishment of estimated costs for each area. Table 1. provides a summary of these costs.

There is a good prospect that trade offs exist for lowering conversion costs, as we have followed a philosophy of a relatively modest machine conversion. With more capable conversion programs at a slightly greater expense for computer conversion costs, there may be a considerable saving on human editorial work required. However, it is our feeling that this area will require more analysis before the exact conversion program specifications may be fixed. Therefore, we chose a conservative approach which uses proven capabilities as opposed to a more adventurous one incorporating unproven capabilities.

TABLE 1. Summary of Costs According to Conversion Work Areas

Task	Detail Cost on Page	Direct Costs	Direct Cost per Title	Indirect Costs	Indirect Cost per Title
1. Machine Conversion	20	9,100	.16	4,222	.08
2. Editorial refinement	34	136,240	2.46	80,670	1.46
3. Aperture Card Production	37,40-43, 48	37,331	.67	10,909	.20
Totals		$182,671	$3.29	$95,801	$1.74

Total of Direct and Indirect Costs $278,472

Total per Title Costs $5.03

Note:

All costs are based on a file size of 55,416 titles as of July 1, 1973 with per title costs computed to account for cost differentials for a larger file in the future.

Indirect costs at the University of Minnesota are:
Fringe benefits 17.5% for academic appointments
Fringe benefits 16.5% for civil service appointments
Indirect overhead costs of 45.5% of salaries of federally sponsored work as negotiated for 1973/74 by the U.S. Dept. of Health, Education, and Welfare with the University

Area 1. MACHINE CONVERSION OF MULS DATA BASE TO NSDP REQUIREMENTS

Contract Requirement

"Provide quantitative estimates of the amount of computer analysis and programming manpower required to perform a machine conversion of the MULS into the NSDP record format."

Introduction

A computer conversion of an existing data base to meet the requirements of another system should be designed to change:

a) the existing machine record format to that of the other system,
b) the character data codes, if different, to those of the other system, and
c) any coded information or content of fields to that required by the other system, if possible or practical due to volume.

Obviously, the computer conversion phase cannot change the significant content of fields due to differences in bibliographic practice. Manual editorial work must be employed to carry out changes of this nature.

Subsections of this area labeled as above discuss the methods and tasks we recommend as a result of this study. These are followed by personnel, resources, and costs associated with the work under this area.

Machine Conversion Rationale

The MULS system is a data base stored on disk storage, using direct access methods and random transaction processing. The external output from this processing and from the former tape system is a format we call the MULS-MARC format. It is essentially a MARC communications format with certain simplifications in the Leader and Record Directory portions of the record.

After performing the analyses shown in the following pages, we feel that the most feasible method to achieve the machine conversion to be that of preprocessing MULS-MARC to become in format and code structure identical to L.C. MARC Serials internal format. In this manner, the need to redo extensive programming done in the NSDP MARC CONVERSION PROGRAM (Program I.D. No. 0172035) is avoided. Using existing software, which is known to be running well and which produces familiar output and system controls, will be less expensive. Also, the converted result would be available more timely, thereby permitting the important manual editorial tasks to proceed. We cannot emphasize too strongly the need to use existing software to minimize cost when that software does precisely what is needed as is the case in this situation.

1.A. Format Conversion by Computer

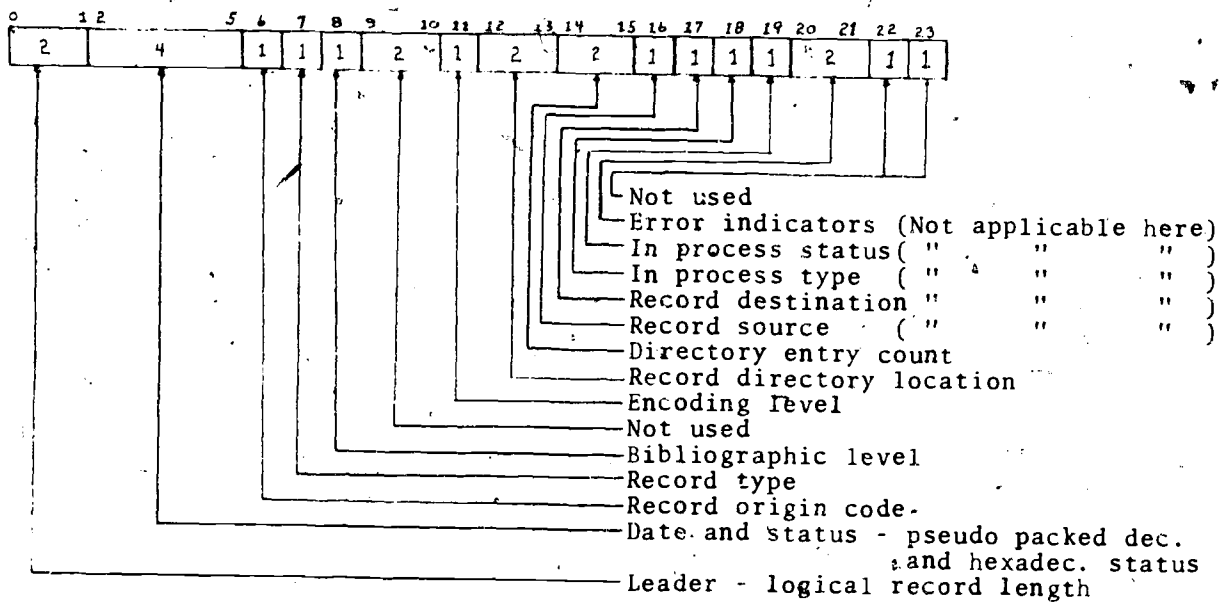
This section contains a comparison of the MULS, MARC, and NSDP record formats. This comparison shows that by bringing the MULS-MARC format to that of the L.C. MARC Serials internal format, the NSDP PROGRAM NO. 0 172035 can be used to accomplish the final step of the conversion process to NSDP internal format.

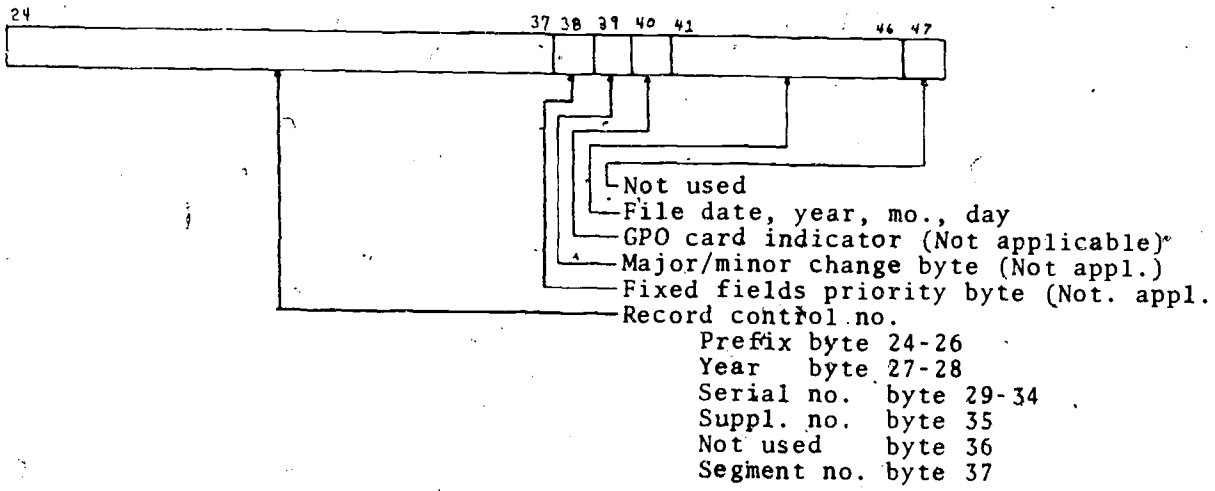
An explanation of program tasks follows this comparison which are needed to convert MULS-MARC to L.C. MARC Serials internal format for input to the above NSDP program. Details of the variable length fields of MULS-MARC are included with these tasks so that the full implications of machine conversion may be seen.

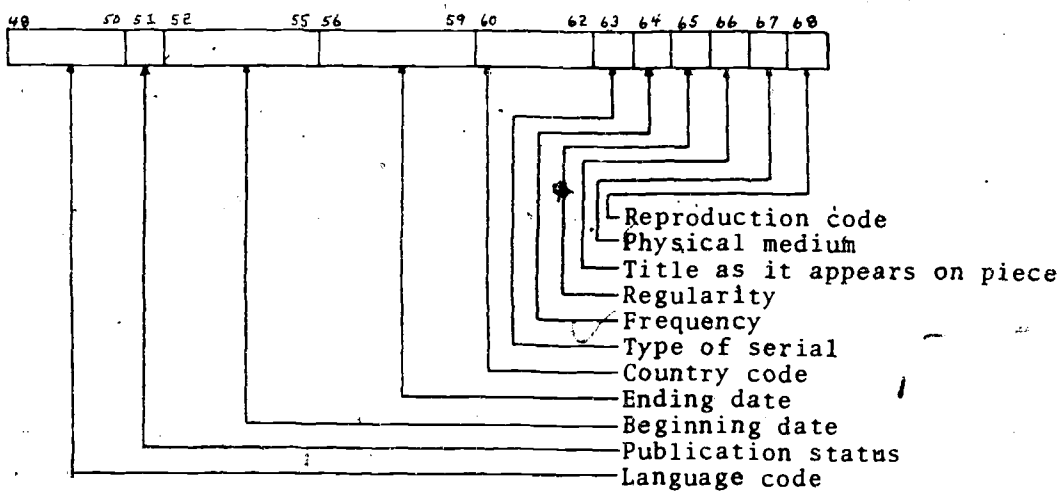
The output tape from the preprocessing suggested here should be 9 channel, odd parity 800 bpi. Logical records should be unblocked with physical record lengths not to exceed 2040 characters. Standard labels should be used.

MARC SERIALS INTERNAL FORMAT

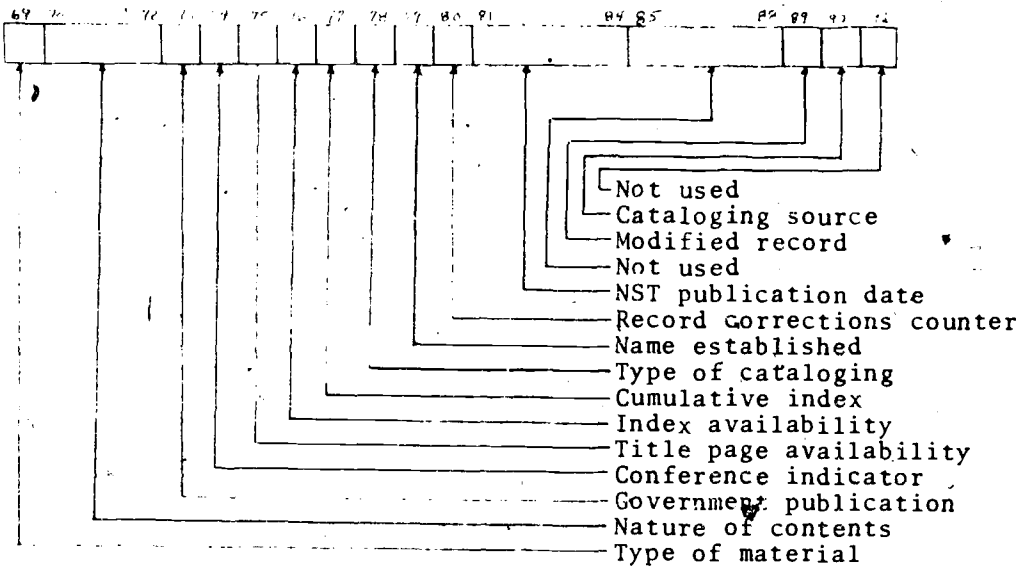
Does not contain a leader as such but rather contains 92 bytes of fixed length data preceeding the 001 Control No. field which is the first tagged data field.





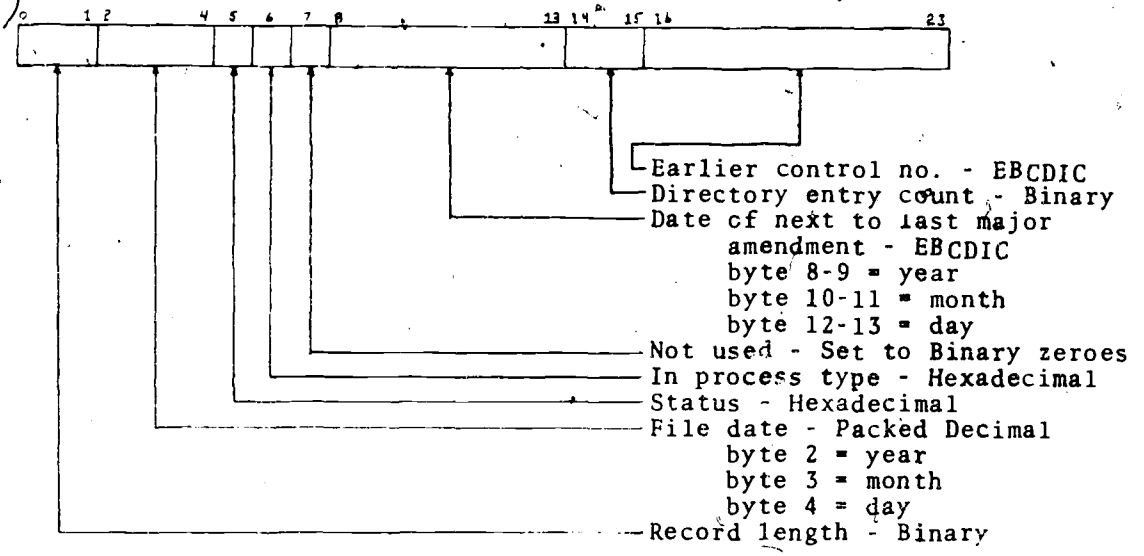


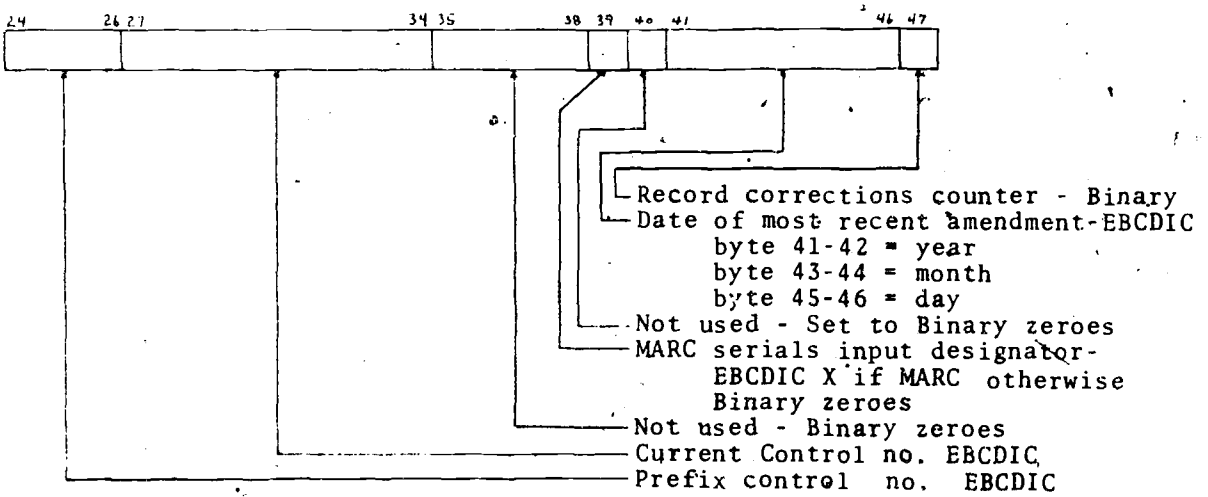
MARC SERIALS INTERNAL FORMAT (Continued)



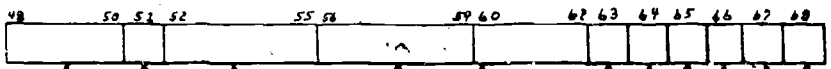
NSDP INTERNAL FORMAT

Does not contain a leader as such but rather contains 92 bytes of fixed length data preceeding Record Directory Entries.

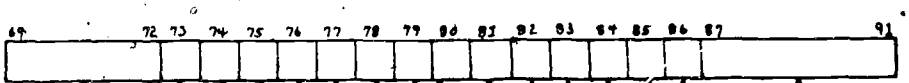




NSDP INTERNAL FORMAT (Continued)



Not used - Set to binary zeroes
Record type - Binary zeroes
Language materials
EBCDIC other values
Not used - Set to binary zeroes
Regularity - EBCDIC taken directly from MARC
Frequency - Binary zeroes - completely irregular
EBCDIC all other values
Type of Serial-EBCDIC for p, m, n;
None-Binary zeroes
Publication country code (ISO code)
EBCDIC
End date - Binary zeroes (None reg.)
????-EBCDIC unknown
Start date - EBCDIC ????-unknown
Publication status - EBCDIC
Publication Language code - 1st From MARC
EBCDIC

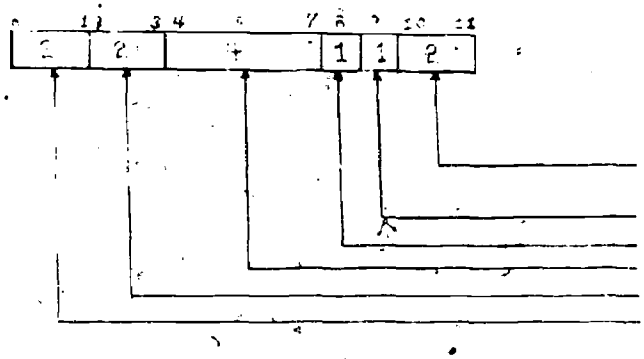


Not used - Binary zeroes
Original alphabet of title - EBCDIC
Centre Code - EBCDIC

Fixed Field status codes
-binary zeroes-no change
-@ = added, * = repl. ! = del.
EBCDIC

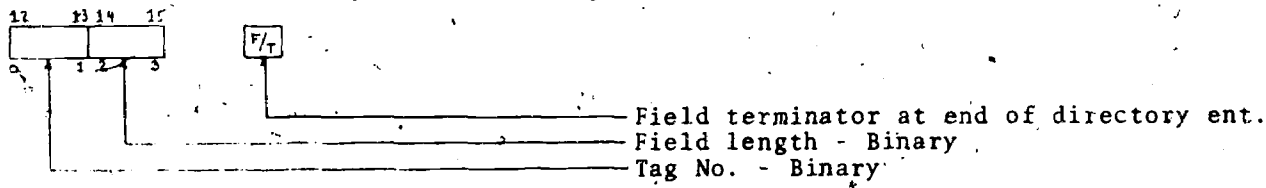
Language
Frequency
End date
Type of publication
Publication status
Original alphabet of title
Country of publication
Start date
Centre code
Not used - binary zeroes
Encoding level - Binary zeroes full level
EBCDIC others
(Conversion could set to = 2
ISDS + NSDP elements incomplete)
External record designator - EBCDIC
(define new use-regional series record).
Reporting codes - EBCDIC
Byte 69 = LC 2-LC 1st report
Byte 70 = NAL 3-NAL 1st report
Byte 71 = NLM 4-NLM 1st report
Byte 72 = Other 5-Other 1st report

LEADER- MULS MARC Length-12 bytes



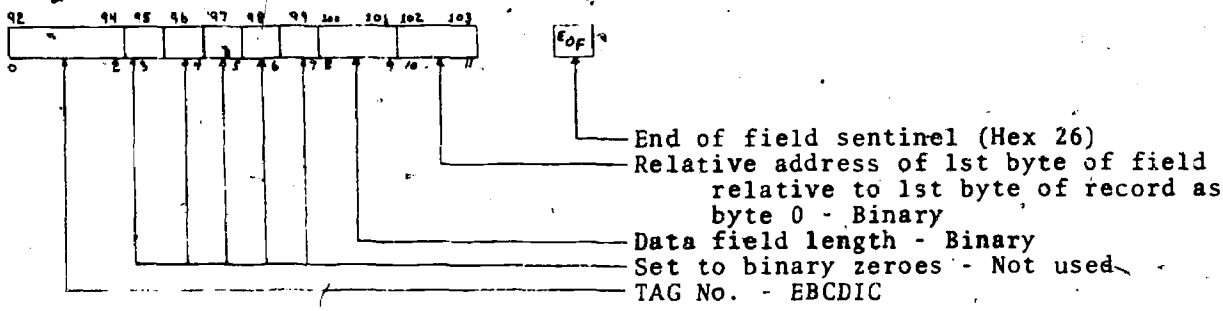
RECORD DIRECTORY

MULS MARC - Record directory for each TAG begins with 008 each 4 bytes ending with F/T character



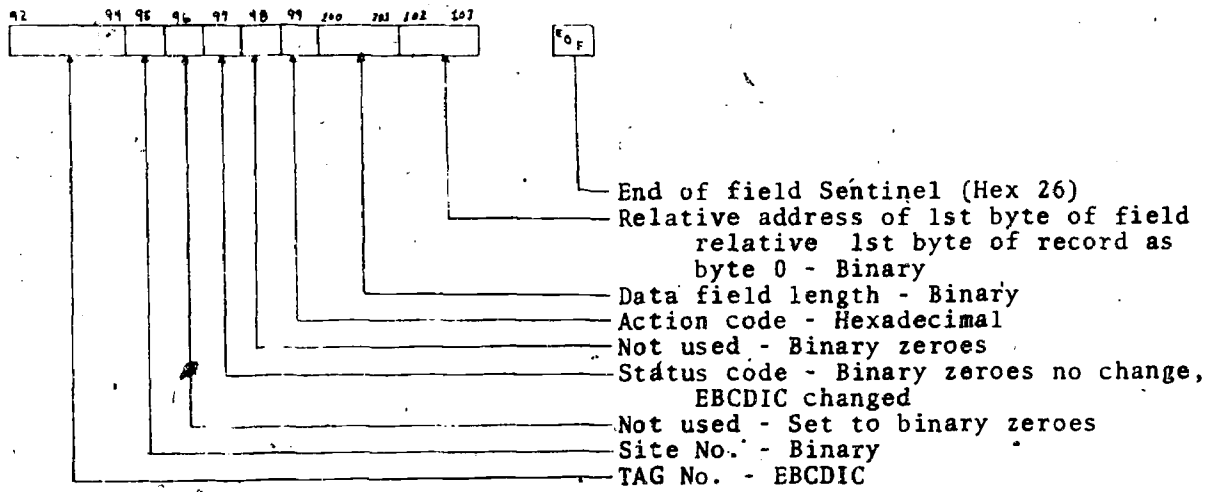
L.C. MARC SERIALS INTERNAL FORMAT

Identical in length to NSDP Internal format except that bytes 95-99 are set to binary zero and not used.



NSDP INTERNAL FORMAT

Record directory follows the 92 byte fixed field area. 1st directory entry begins in byte 92, each record directory is 12 bytes, ending with HEX 26 end of field sentinel.



CONTROL FIELDS

MULS MARC

Does not contain control fields 001-007. Record I.D. normally found in 001, ie. L.C. CARD NO. is stored as variable field TAG 010 or if ISSN stored as TAG 022.

L.C. MARC SERIALS INTERNAL FORMAT

Same as NSDP format. --Does not contain control fields.

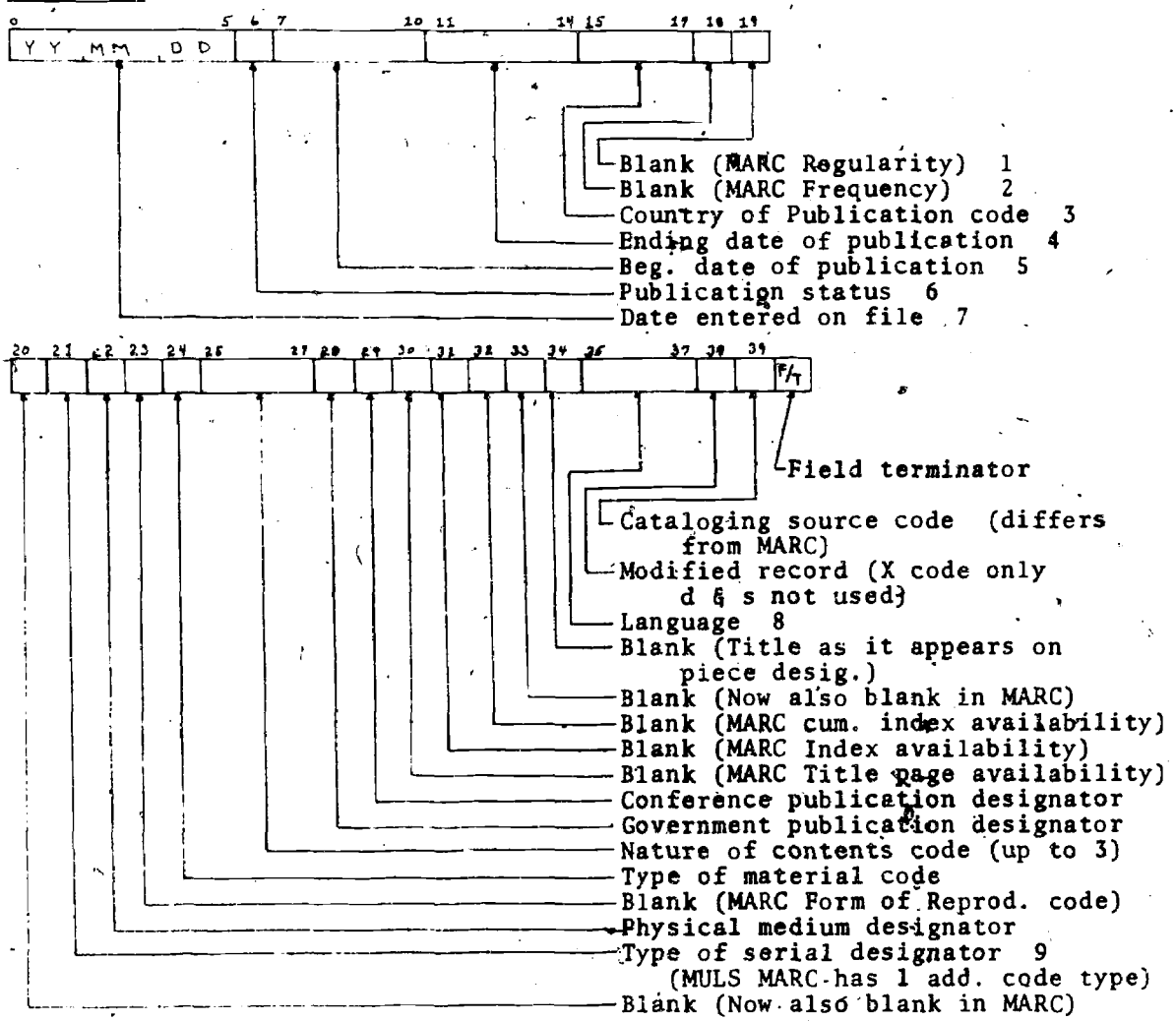
NSDP INTERNAL FORMAT

Does not contain control fields. Current control no. stored in bytes 27-34 of NSDP record. ISSN and LC CARD NO. stored as TAG 022 and TAG 010 respectively.

008--FIXED FIELDS

Contained in the 92 byte fixed length date in both L.C. MARC and NSDP internal formats.

MULS-MARC 40 data char. + F/T character all character mode



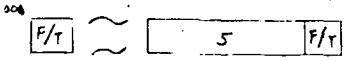
1	NSDP FF	Byte 65	6	NSDP FF	Byte 51
2	" "	Byte 64	7	" "	Byte 2-4
3	" "	Byte 60-62	8	" "	Byte 48-50
4	" "	Byte 56-59	9	" "	Byte 63
5	" "	Byte 52-55			

009--FIXED LENGTH INDIVIDUAL FIELDS

MULS-MARC

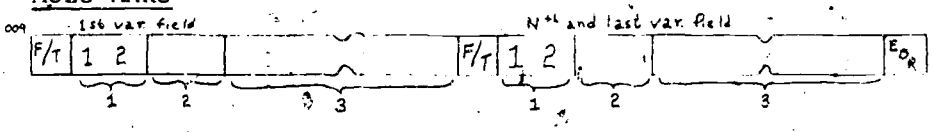
These fields are unique to MULS-MARC and contain the Holdings Location Code no. for each holdings tag 850 and are terminated by a F/T.

Notation is character. Length is 5 bytes. Value is numeric as in LOH table.



VARIABLE FIELD DATA TAGS 010-999

MULS MARC

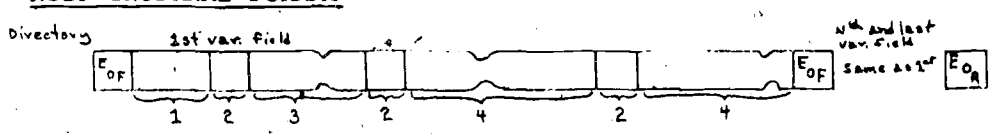


F/T = Field terminator
1 = Indicators 1 and 2
2 = Subfield code (delimiter
3 = Data and next subfield code if applicable
EOR = End of record code

L.C. MARC SERIALS INTERNAL FORMAT

Identical to NSDP internal format below.

NSDP INTERNAL FORMAT



EOF = End of Field Sentinel Following Directory Hex 26
1 = Indicators 1 and 2
2 = Delimiter - Hex FA
3 = Nested tag code (MARC Lowertase alpha identifier)
4 = Data subfield
EOR = End of record character - Hex 37

MACHINE FORMAT

Program tasks to convert MULS-MARC to L.C. MARC Serials internal format.

1. Move MULS Leader byte 0-1, Length of record to internal format byte 0-1.
2. Move MULS I.D. No. Leader byte 4-7 to internal format Control field 001 to temporarily store until conversion completion.
3. Move MULS Leader byte 8, type of record to internal format byte 7.
4. Create record directory for each variable field 12 bytes long with MULS record directory information as below:
    a. Byte 0-1, tag no. (binary) move to relative byte 0-2 and convert to EBCDIC.
    b. Byte 2-3, field length (binary) move to relative byte 8-9.
    c. Calculate relative address of 1st byte of field relative to 1st byte of record as byte 0 and load into relative byte 10-11 in binary.
    d. Load relative bytes 3-7 with binary zeroes.
5. Load MULS-MARC fixed field data into MARC internal format as below:
    a. Move byte 0-5, Date entered on file to MARC byte 2-4, convert to packed decimal.
    b. Move byte 6, Publication status to MARC byte 51, EBCDIC value.
    c. Move byte 7-10, Beginning publication date to byte 52-55, EBCDIC value.
    d. Move byte 11-14, Ending publication date to byte 56-59, EBCDIC value.
    e. Move byte 15-17, Country of publication to byte 60-62, EBCDIC value
    f. Move byte 21, Type of serial to byte 63, EBCDIC value.
    g. Move byte 22, Physical medium designator to byte 67, EBCDIC value.
    h. Move byte 24, Type of material to byte 69, EBCDIC value.
    i. Move byte 25-27, Nature of contents code to byte 70-72 respectively, EBCDIC values.
    j. Move byte 28, Government publication designator to byte 73, EBCDIC value.
    k. Move byte 29, Conference publication designator to byte 74, EBCDIC value.
    l. Move byte 35-37, Language to byte 48-50, EBCDIC value.
    m. Move byte 38, modified record designator to byte 89, EBCDIC value.
    n. Move byte 39, cataloging source code to byte 90, EBCDIC value.
    o. Set all fields above not containing data to binary zero.
    p. Set any remaining byte positions in the initial 92 bytes not used to binary zero.
6. Create variable fields in MULS-MARC to L.C. MARC internal form as below:
    a. Load indicator values from MULS-MARC relative byte 1-2 to L.C. MARC internal variable field relative byte 1-2, EBCDIC value if indicators are present, otherwise binary zeroes.
    b. Load byte 3 with delimiter (Hex FA).
    c. Extract subfield codes in MULS-MARC and load in byte 4 and following, ending with delimiter (Hex FA).
    d. Load first data subfield ending with delimiter (Hex FA) followed by second, etc., ending with End of field (Hex 26).
    e. At end of record, end last data subfield with END OF RECORD (Hex 37).
    f. Delete any unwanted tags such as 850 Holdings.
    g. Renumber Tags 809 and 950 possibly to 730 or 710 if this is proved feasible through further analysis.
    h. Renumber Tag 200 to 245.
    i. Restore actual 809 and 950 text to parent record from the generated cross-reference print entries, replacing I.D. number links.

VARIABLE FIELDS in MULS-MARC.

Format of the MULS-MARC variable fields as to indicator number, positions, delimiters and subfield codes and data are identical to L.C. MARC Serials communications format.

Indicator values may differ.

Subfields in some cases are not separately identified within a given TAG to the degree done in L.C. MARC.

Field content or meaning varies from L.C. MARC in the use of:
1.) TAG 200 Title as it appears on piece,
2.) TAG 269 to store SORT KEY if kept with the record,
3.) TAG 809 to signify an entry classed as an Added Entry Tracing, and
4.) TAG 950 to signify an entry classed as a cross reference tracing.

A discussion of each variable field follows.

TAG 010 Library of Congress Card No.

Indicators are blank - identical to MARC

Subfield code implemented is $a - identical to MARC.

TAG 022 Standard Serial Code.

Indicators are blank - identical to MARC.

TAG 041 Languages

Indicator positions not used. MARC used 1st indicator only. 2nd blank.

Subfield $a and subfield $b used.

Subfield $c has not been used to date.

TAG 100 Main Entry Personal Name

Indicator positions are used as follows:
Indicator 1 is set to 1.
Indicator 2 is set to a value 0-9 to indicate filing omission characters.

Implemented:
Subfield $a - Name (surnames & forenames)
$d - Dates
$e - Relator

Not implemented:
Subfields $b - Numeration
$c - Titles or other words associated with name

TAG 110 Main Entry - Corporate Name

Indicator positions are as follows:
Indicator 1 is not used, set to blank.
MARC uses values
Ø - Surname
1 - Place or place & name
2 - Name (direct order)
Indicator 2 is set to a value 0-9 to indicate filing omission characters.
Implemented subfields identical to MARC:
$a - Name
$b - Each subordinate unit
$k - Form subheading

TAG 111 Main Entry - Conference or Meeting

Indicator position 1. set to 2 (Name in direct order)

Indicator position 2 is set to a value 0-9 to indicate filing omission character.

Subfield implementation:
$a - Name
$c - Place
$e - Subordinate unit in name

MARC subfields not used:
$g - other misc. information
$b - Number (from MARC MONOGRAPH FORMAT)
$d - Date (when held) (FROM MARC MONOGRAPH FORMAT)

*TAG 200 Title as it Appears on the Piece

Indicator position 1 is set to 0 (No title added entry).

Indicator position 2 is set to a value 0-9 to indicate filing omission characters.

Subfields are identical to TAG 245.

*Note TAG 200 differs in meaning from MARC. It gives the title when it is unverified and 008 cataloging source field carries a code "x" meaning unverified. Therefore, it is really more identical to TAG 245 as determined according to AACR.

TAG 210 Abbreviated Title

Indicator positions 1 and 2 set to zero. Subfield $a only used.

TAG 245 Full Title

Indicator 1 is set to ø.	MARC uses ø - No title added entry
Indicator 2 is set to a value 0-9 to indicate filing omission characters.	1 - Title a.e. Identical to MARC.

Subfield codes are identical to MARC

TAG 250 Edition Statement

Indicators are blank as in MARC.

Subfield code $a identical to MARC.

TAG 260 Imprint

Indicator 1 is set to ø - MARC uses ø - Pub. Not. M.E.
1 - Pub. is M.E.

Indicator 2 is set to 1 - MARC uses ø - Pub. & issuing body not same.
1 - Pub. & issuing body same.

Implemented:
Subfield Codes $a Place of Pub.
$b Publisher and/or Distributor

Not Implemented:
Subfield Code $c - Date

TAG 500 General Note

Indicators are blank as in MARC.

Subfield code $a used as in MARC.

*TAG 501 Bound with Note

Indicators are blank as in MARC.

Subfield code $a used as in L.C. MARC MONOGRAPH FORMAT.

*Note: This tag is derived from the L.C. MARC MONOGRAPH FORMAT.

*TAC 502 Dissertation Note

Indicators are blank as in MARC.

Subfield code $a used as in L.C. MARC MONOGRAPH FORMAT.

*See above note for TAG 501.

*TAG 505 Contents Note

Indicator 1 is set to ∅. MARC uses ∅ - Contents complete
1 - Contents incomplete
2 - Partial contents

Indicator 2 is blank as in MARC.

Subfield code $a used as in L.C. MARC MONOGRAPH FORMAT.

*See above note for TAG 501.

TAG 510 Indexing & Abstracting Coverage

Indicator 1 is set to ∅. MARC uses ∅ - Type of coverage unknown
1 - Dates
2 - Indexed selectively

Indicator 2 is blank as in MARC.

Subfield code $a only used. MARC uses $a - Coverage
$b - Dates
$c - Standard Serial No.

TAG 515 Note on Volumes, Dates, Etc.

Indicators are blank as in MARC.

Subfield code $a only used MARC uses $a - Note
$z - Source

TAG 525 Note on Supplements

Indicators are blank as in MARC.

Subfield code $a only used. MARC uses $a - Note
$z - Source

TAG 555 Note on Cumulative Indexes

Indicators are blank as in MARC.

Subfield code $a only used as in MARC.

TAG 809 Added Entry Tracings

This tag is non-MARC in that it includes personal names, corporate names, variant titles, series added entries lumped together in one tag.

MARC TAGS 240 - Uniform title
200 - Varying forms of title
400 - Series p.n.
410 - Series c.n.
411 - Series Conference
440 - Series-Title
700 - Added entry, p.n.
710 - Added entry, c.n.
711 - Added entry conference
730 - Added entry uniform titles
760 - Main series entry

The above tags would contain the data normally found in TAG 809.

In this tag Indicator 1 is blank.

Indicator 2 is set to 1 to indicate secondary entry as in TAG 200.

Subfield code $a is used.

Within Subfield $a a "/-" separates corporate bodies names from titles.

TAG 850 Holdings

Indicators are blank as suggested in MARC.

Subfield codes differ from MARC except that MARC subfield $a is also used for NUC Symbol in MULS-MARC.

Subfield codes employed are:
$a - NUC symbol
$b - Holding location mnemonic symbol (1-3 char.)
$c - Sublocation symbol (1-3 char.)
$d - Holding statement
$e - Call no. (repeatable)
$f - Local note pertaining only to reporting location

TAG 950 Cross References

In MULS-MARC this tag utilizes the same structure and content rules as TAG 809 except that these entries were made originally as cross references instead of added entry tracings on the catalog card. The same MARC fields are covered by this tag as under TAG 809. Both TAGS serve the purpose of causing a "See" record to be printed referring back to the parent record. Both indicators are blank.

1.B. CHARACTER CODE CONVERSION

The MULS data base employs an 8 bit code associated with the ALA print train graphics.

A Table is included in this section which suggests an equation of the codes of the MULS character set with the Internal EBCDIC Code used by both NSDP and L.C. MARC Serials internal formats. As can be seen from this table there are codes in the MULS set which do not have assigned equivalences in the other set. Prior to actual conversion, NSDP would have to work with the MULS programming staff on determining the exact character set conversion equivalences desired.

CONVERSION TABLE

MULS-EBCD 8 bit code	HEX VALUE	MARC (EBCDIC) INTERNAL SET	HEX VALUE
Null	00	Null	00
Start of Heading	01		
Start of Text	02		
End of Text	03		
Punch off	04	Punch off	04
Horizontal tabulation	05	Horizontal tabulation	05
Lower case	06	Lower case	06
Delete	07	Delete	07
	08		
	09		
Start manual message	0A		
Vertical tab	0B		
Form feed	0C		
Carriage return	0D		
Shift out	0E		
Shift in	0F		
Data link escape	10		
Device control 1	11		
Device control 2	12		
Tape Mark	13	Tape Mark	13
Restore	14	Restore	14
New line	15	New line	15
Backspace	16	Backspace	16
Idle	17	Idle	17
Cancel	18		
End of medium	19		
Cursor Control	1A	Cursor Control	1A
Customer use 1.	1B		
Interchange file separator	1C		
Interchange Group separator	1D	End of record (end of transmission	37
Interchange Record separator	1E	End of Field terminator	26
Interchange unit separator	1F	Delimiter	FA
Digit select	20	Digit select	20
Start of Significance	21	Start of significance	21
Field separator	22	Field separator	22
	23		
Bypass	24		
Line Feed	25	Line Feed	25
End of transmission block	26	End of block	26
Escape	27		
	28		
	29		
Set Mode	2A	Set Mode	2A
Customer use 2.	2B		
	2C		
Enquiry	2D		
Acknowledge	2E		
Bell	2F		
	30		
	31		
Synchronous idle	32		
	33		
Punch on	34	Punch on	34
Reader stop	35	Reader stop	35
Upper case	36	Upper case	36
End of transmission	37	End of transmission	37
	38		
	39		
	3A		
Customer Use 3.	3B		
Device Control 4	3C		
Negative acknowledge	3D		
	3E		
Substitute	3F		
Space	40	Space	40

CONVERSION TABLE

MULS-EBCD 8 bit code		HEX VALUE	MARC (EBCDIC) INTERNAL SET		HEX VALUE
Music	♭	41	Music flat	♭	3D
U.C. Polish	Ł	42	U.C. Polish	Ł	CE
U.C. Scandinavian	Ø	43	U.C. Scandinavian	Ø	DB
U.C.	Đ	44	U.C.	Đ	CB
U.C. Thorn	Þ	45	U.C. Thorn	Þ	DC
U.C. Scandinavian	Æ	46	U.C. Scandinavian	Æ	CA
U.C. Scandinavian	Œ	47	U.C. Scandinavian	Œ	CF
Subscr. Trade MARK	℗	48	Subscr. Patent	℗	3C
Middle dot	·	49	Middle dot	·	64
Cent sign	¢	4A	Cent sign	¢	4A
Period or decimal pt.	.	4B	Period	.	4B
	<	4C	Less than	<	4C
	(	4D	Opening parenthesis	(	4D
	+	4E	Plus	+	4E
		4F	Logical OR	|	4F
		50	Ampersand		50
Subscript 1		51	Subscript 1		71
Subscript 2		52	Subscript 2		72
Subscript 3		53	Subscript 3		73
Subscript 4		54	Subscript 4		74
Subscript 5		55	Subscript 5		75
Subscript 6		56	Subscript 6		76
Subscript 7		57	Subscript 7		77
Subscript 8		58	Subscript 8		78
Subscript 9		59	Subscript 9		79
	!	5A	Exclamation point	!	5A
	$	5B	Dollar sign	$	5B
	*	5C	Asterisk	*	5C
	)	5D	Closing Parenthesis	)	5D
	;	5E	Semicolon		5E
		5F	Logical NOT	¬	5F
Hyphen-minus	-	60	Hyphen, minus sign	-	60
	/	61	Slash	/	61
L.C. Polish	ł	62	L.C. Polish	ł	8E
L.C. Scandinavian	ø	63	L.C. Scandinavian	ø	9B
L.C.	đ	64	L.C.	đ	8B
L.C. Thorn	þ	65	L.C. Thorn	þ	9C
L.C. Scandinavian	æ	66	L.C. Scandinavian	æ	8A
L.C. Scandinavian	œ	67	L.C. Scandinavian	œ	8F
Turkish undotted	ı	68	Turkish (undotted)	ı	8D
Double acute T. Znak	˝	69	Double acute (T. Znak(52))	˝	10 +52
Comma	,	6B	Comma	,	6B
	%	6C	Percent	%	6C
Escape (underline)	_	6D	Underscore	_	01, 6D
	>	6E	Greater than	>	6E
	?	6F	Question mark	?	6F
Ångstrom (circle above)	°	70	Ångstrom	°	03
Circumflex	^	71	Circumflex	^	08
Umlaut	¨	72	Umlaut (11) Dieresis (12)	¨	11, 12
		73			
Acute (M. Znak)	´	74	Acute (OF) M. Znak	´	OF, 51
Superior dot	˙	75	Superior dot	˙	0A
Cedilla (left hook)	¸	76	Cedilla (09), left hook (OB)	¸	09, OB
Breve/upadh.	˘	77	Breve (2C) upadhmaniya (28)	˘	2C, 28
Hacek	ˇ	78	Hacek	ˇ	OE
Grave	`	79	Grave	`	2B
Colon	:	7A	Colon	:	7A
No. Sign	#	7B	No. sign (crosshatch)	#	7B
At sign	@	7C	At sign	@	7C
Apostrophe, prime, single quote	'	7D	Apostrophe	'	7D
Equals	=	7E	Equals	=	7E
Double quote	"	7F	Double quote	"	7F

CONVERSION TABLE

MULS-EBCD 8 bit code		HEX VALUE	MARC (EBCDIC) INTERNAL SET		HEX VALUE
Subscript	ø	80	Subscript	ø	65
Lower case	a	81	Lower case	a	81
Lower case	b	82	Lower case	b	82
Lower case	c	83	Lower case	c	83
Lower case	d	84	Lower case	d	84
Lower case	e	85	Lower case	e	85
Lower case	f	86	Lower case	f	86
Lower case	g	87	Lower case	g	87
Lower case	h	88	Lower case	h	88
Lower case	i	89	Lower case	i	89
Pseudo Question	?	8A	High Question	?	23
		8B			
		8C			
Superscript parent	(	8D	Superscript parent	(	58
Superscript plus	+	8E	Superscript plus	+	56
Superscript minus	-	8F	Superscript minus	-	57
		90			
Lower case	j	91	Lower case	j	91
Lower case	k	92	Lower case	k	92
Lower case	l	93	Lower case	l	93
Lower case	m	94	Lower case	m	94
Lower case	n	95	Lower case	n	95
also hook ơ	o	96	Lower case	o	96
Lower case	p	97	Lower case	p	97
Lower case	q	98	Lower case	q	98
Lower case	r	99	Lower case r	r	99
	‡	9A	Delimiter ‡ (double dagger)		FA
		9B			
		9C			
Superscript parent	)	9D	Superscript parent	)	59
	±	9E		±	3B
		9F			
Macron	‾	A0	Macron	‾	19
Tilde, Double tilde	~	A1	Tilde (29)~Double tilde(2D)~		29, 2D
Lower case	s	A2	Lower case	s	A2
Lower case	t	A3	Lower case	t	A3
Lower case	u	A4	Lower case	u	A4
Lower case	v	A5	Lower case	v	A5
Lower case	w	A6	Lower case	w	A6
Lower case	x	A7	Lower case	x	A7
Lower case	y	A8	Lower case	y	A8
Lower case	z	A9	Lower case	z	A9
Greek Alpha	∝	AA	Greek Alpha	∝	FD
Greek Beta	∕	AB	Greek Beta	∕	FE
Greek Gamma	∫	AC	Greek Gamma	∫	FF
Opening bracket	[	AD	Opening Bracket	[	BE
		AE			
		AF			
Superscript	0	B0	Superscript	0	55
(Eth)6 Superscript	1	B1	Superscript (Eth) 6	1	8C
	2	B2		2	42
	3	B3		3	43
	4	B4		4	44
	5	B5		5	45
	6	B6		6	46
	7	B7		7	47
	8	B8		8	48
	9	B9		9	49
		BA			
		BB			
Subscript Parent	(	BC	Subscript parent	(	68
Closing bracket	]	BD	Closing bracket	]	3F
		BE			
		BF			

CONVERSION TABLE

MULS-EBCD 8 bit code		HEX VALUE	MARC (EBCDIC) INTERNAL SET		HEX VALUE
		CO			
Upper case	A	C1	Upper case	A	C1
Upper case	B	C2	Upper case	B	C2
Upper case	C	C3	Upper case	C	C3
Upper case	D	C4	Upper case	D	C4
Upper case	E	C5	Upper case	E	C5
Upper case	F	C6	Upper case	F	C6
Upper case	G	C7	Upper case	G	C7
Upper case	H	C8	Upper case	H	C8
Upper case	I	C9	Upper case	I	C9
Subscript plus	+	CA	Subscript plus	+	66
Subscript minus	-	CB	Subscript minus	-	67
Subscript c. parent.	)	CC	Subscript c. parent.	)	69
		CD			
Ayn	ʿ	CE	Ayn	ʿ	54
Reverse cedilla, right hook	ȩ	CF	Reverse cedilla (OD) right hood (OC)	ȩ	OD, OC
		D0			
Upper case	J	D1	Upper case	J	D1
Upper case	K	D2	Upper case	K	D2
Upper case	L	D3	Upper case	L	D3
Upper case	M	D4	Upper case	M	D4
Upper case	N	D5	Upper case	N	D5
Upper case	O	D6	Upper case	O	D6
Upper case	P	D7	Upper case	P	D7
Upper case	Q	D8	Upper case	Q	D8
Upper case	R	D9	Upper case	R	D9
		DA			
Pound sign	£	DB	Pound Sign	£	6A
		DC			
		DD			
Dot below	.	DE	Dot below	.	1C
Double dot below	..	DF	Double Dot below	..	1B
Reverse slash	\	EO	Reverse Slash	\	FC
		E1			
Upper case	S	E2	Upper case	S	E2
Upper case	T	E3	Upper case	T	E3
Upper case, also hook	U	E4	Upper case	U	E4
Upper case	V	F5	Upper case	V	E5
Upper case	W	E6	Upper case	W	E6
Upper case	X	E7	Upper case	X	E7
Upper case	Y	E8	Upper case	Y	E8
Upper case	Z	E9	Upper case	Z	E9
Circle below	ₒ	EA	Circle below	ₒ	1D
Double underscore	‗	EP	Double underscore	‗	02
Chair	ˆ	EC			
Alif, high comma	ʾ	ED	Alif (53) high comma(1E)	ʾ	53, 1E
Tail	)	EE	Left hook	)	OB
Candrabindu	̃	EF	Candrabindu	̃	18
	0	F0		0	F0
	1	F1		1	F1
	2	F2		2	F2
	3	F3		3	F3
	4	F4		4	F4
	5	F5		5	F5
	6	F6		6	F6
	7	F7		7	F7
	8	F8		8	F8
	9	F9		9	F9
Ligature 1st half	‿	FA	Ligature 1st half	‿	2E
Ligature 2nd half	‿	FB	Ligature 2nd hlaf	‿	2E
		FC			
		FD			
		FE			
		FF			

1.C. FIELD CONTENT MODIFICATION

The following fixed fields contain codes which differ from L.C. MARC SERIALS and do not have equivalents. These codes are not provided for in NSDP but represent an enrichment to both NSDP and MARC:

Type of serial designator - code c= continuation (defined as a serial item treated as a book).

Government publication designator - code u= University or College.

Cataloging source code - all codes differ from L.C. MARC. The presence of an L.C. Card No. TAG in combination with codes m, s, l, c, n, q, signify L.C. cataloging. This code could be automatically set to a value designating L.C. cataloging as the source.

The MULS record employs a filing omission value on both main entry (1xx) and title TAGS (200 and 245). This differs from the L.C. practice of employing this feature on title only. The 2nd indicator position is used for this provision just as in the MARC record.

The variable fields would not be changed, except for the possibility of changing TAG 200 to a value of 245, TAGS 809 and 950 to a 710 since most seem to deal with corporate bodies or titles.

Another suggested function which could be performed by the MULS-MARC conversion program would be the extraction of information to build the NSDP tags for the following:

Former title (780)
Successor title (785)

This information is present in the MULS general note field (TAG 500). The notes on which MULS has standardized are those found in use as the second indicator in TAG 780 and 785. Although presently non-standard notes exist, one of the current editorial functions is to eradicate these. Therefore, it is highly probable that the conversion proposed would be able via program to extract, tag, and set indicator values for the 780 and 785 fields with a high degree of success.

Such provisions in the program would search each 500 tag for key phrases whose values would be stored in a table. Standard phrases with their appropriate tag and indicator value are:

Continues (780) (0)
Continues in part (780) (1)
Supersedes (780((2)
Supersedes in part (780) (3)
Formed by the union of . . . . and (780) (4)
Absorbed (780) (5)
Absorbed in part (780) (6)
Continued by (785) (0)
Continued in part by (785) (1)
Superseded by (785)(2)
Superseded in part by (785)(3)
Absorbed by (785)(4)
Absorbed in part by (785)(5)
Split into . . .and . . . (785)(6)
Merged with . . . to form (785)(7)
Changed back to . . . . (785)(8)

Examples of non-standard notes which may remain but could be appropriately identified are:

Title was formerly: (780)(0)
Title varies: (780)(2)
Preceded by (780)(2)
Continues its (780)(1)
Continues in part its (780)(1)
Succeeded by (785)(0)
Formerly (780)(0)
Continued as (785)(0)
Formerly called (780)(2)

The other area of content change is transliteration variations between L.C. conventions and those standards used by NSDP. Most notable would be Cyrillic titles, although Arabic, Hebrew and others are present in the MULS data base.

Following are the languages of publication with the numbers of titles present which may need changes in transliteration:

Arabic	41
Hebrew	44
Yiddish	1
Japanese	529
Ukranian	23
Other slavic	2
Russian	642
Serbian	34
Bulgarian	26
Macedonian	2
	1,344 Total (2.4% of the MULS data base)

In comparing the ISO transliteration and the ANSI Z39 standards, there appears to be a small difference in the treatment of certain letters in cyrillic. For this reason it appears less costly to handle the relatively few changes necessary (at most 2.4% of the total records in the data base) manually as an editorial function, rather than via computer.

1.D. COSTS FOR MACHINE CONVERSION PHASE

The previous sections have stated in some detail the work required for the machine conversion phase. Table 1.D. shows the Direct and Indirect costs for machine conversion together with per title costs.

TABLE 1.D.

Direct Costs	Amount	Indirect Costs	Amount
Programmer 3 man mo. @$1000 mo.	$3,000	Fringe benefits @16.5%	$ 495
		Indirect costs @45.5%	1,365
Project Director 3 man mo. @ $1250 mo.	3,750	Fringe benefits @17.5%	656
		Indirect costs @45.5%	1,706
Computer time Debugging & testing 10 hr.@ $150 hr.	1,500		
Tape conversion production 5 hr. @ $150 hr.	750		
Supplies (paper, tape,cards,etc.)	100		
Direct Total	$9,100	Indirect Total	$4,222
Direct Total per Title	$.16	Indirect Total per Title	$.08
Grand total $13,322			
Total Cost Per Title $.24			

One other cost may be incurred with this process. This would be production of a listing from the tape which we feel should be optional at the discretion of NSDP. Since the tape processed from this work would be input to the NSDP MARC conversion program, the file listing should optimally be produced after that processing run. In this manner the listing format would be as desired for processing further into the NSDP system.

The computer center proposed for use in this phase would be the University of Minnesota Administrative Services Data Processing Center which has an IBM 370/145 computer system.

No costs have been included for running the NSDP-MARC conversion program as these must be determined by NSDP from the number of records to be input along with the present running times and changes incurred at NSDP's processing center.

Area 2. EDITORIAL REFINEMENT OF A MACHINE CONVERTED FILE

Contract Requirement

"Provide estimates of the kinds, amounts, and sources of the data needed to bring the machine-converted file into full NSDP specification; provide quantitative estimates of the amount of professional, para-professional, and clerical effort required to bring the machine-converted file into full NSDP specification."

2.A. Assumptions

The basic function of the editorial refinement task is to perform work requiring intellectual evaluation and judgement in applying the rules of the NSDP bibliographic system. There is the potentiality of a trade off of costs and effort between the machine conversion area and the manual task area. In the first area of this study we have costed the machine phase based upon a modest level of manipulation of the MULS record.

Our basic assumption for the manual conversion effort is that the MULS record content and a title page/masthead surrogate, if possible, would provide the information to be converted either via computer or manually to the form and according to the rules employed by the NSDP system. Figure 2.1 shows a detailed comparison of each NSDP field with its counterpart if present in MULS or an indication of lack of presence in MULS. We do not imply that each field of the NSDP record would be provided live data, as such data, if not present in the MULS data base or on a surrogate, would have to be obtained from presently indeterminate sources.

It is our opinion that such a complete conversion would imply exceedingly high costs - at least of the order of original cataloging performed in a large library - which would be difficult to estimate accurately due to lack of precise information on the source of these additional items of information. Therefore, the conversion presented here would result in a NSDP record having the essential ISDS elements, the essential National Elements and some of the other ISDS and National elements currently provided for by the NSDP system but supplied only if readily available.

There has not been sufficient time under this study to make a detailed analysis of the potential trade off of tasks between the machine and manual stages. However, it is our feeling that perhaps the manual work might be lightened if automated techniques were further applied to the MULS-MARC record when it takes the form physically of the L.C. MARC Serials record. For example, the MULS-MARC TAG 809 or 950 may be able to be searched via some parameters to determine if they contain personal name, corporate name or conference authors and so automatically assign the correct 700 series tag to a significant portion of these tags. Another example might be the searching of our 850 holdings tags to determine if a $e subfield exists with a call no. in it and then determine if the number is a Dewey Decimal, L.C. or other call no. and then load this number appropriately in the NSDP record. Another example was the searching of the 500 tag for titles to be stored as 780 or 785 tags which we previously discussed in section 1.c of this report.

2.B. Method

Without some further determination of the trade off between the machine and manual area as discussed above we have chosen here to propose a method which would apply our assumption that present MULS record content together with any title page/masthead surrogate possibly provided would provide the raw data for each specific title.

It is our estimate that about 20,000 - 25,000 titles in the MULS data base may be recorded together under latest title, i.e. superimposed. These records will present the most formidable editorial task. To show some of the basic differences and also some similiarities we have included in Figures 2.2 through 2.5 some sample records which are presently included in both NSDP and MULS. Figure 2.2 shows a title with corporate body author and its corresponding MULS entry in Table 2.2A. One can see that the essential information is present from which key-title can be determined. Figures 2.3 and 2.3A show a title form of entry in which the

NSDP key-title is identical to the MULS record although the MULS record does not show a verification of bibliographic information or L.C. card number. Figures 2.4 and 2.4A show again records with matching titles and key-titles but with an interesting variant title shown in the NSDP record as well as the previous title for the first eleven volumes which should form a separate record which has an ISSN in MULS, essential data elements present but in some conflict with the information in the NSDP record due to the MULS data source Library of Congress card no. 52-48680.

The manual editorial work would occur after the machine conversion stage as outlined in the previous area was performed, together with any further possible automated procedures designed to facilitate the editorial process. As previously stated the NSDP MARC conversion program would be used to place the data in a form acceptable to the file processing and updating software of NSDP. From this process would result the initial listings from which editors would work.

At this point in the method it would be desirable to begin producing aperture card surrogates of the records to facilitate editorial work. However, we recognize this area would have to be funded to permit such timing to occur, which would not be the case if a staged approach to the conversion were necessary unless that approach was to develop a subset of the data base and surrogates accompanying the subset.

Once the listings were available for editorial use the actual editing could be handled in a variety of ways. These are:

a) By NSDP in its headquarters,
b) By the University of Minnesota under a grant or contract, or
c) By a third part contractor.

We have assumed the method employed would be under grant or contract with the University of Minnesota. Therefore, our personnel and cost estimates also reflect present familiarity with the MULS data base and the need for mastering the NSDP system rules and structure.

The next step would be the keyboarding of the data changed or added by an editor to a record through viewing the existing record's content and applying the NSDP rules to generate key-title (provisional, until approved by NSDP personnel) and any other information supplied by the record itself or its surrogate. Again this keyboarding could be handled in one of several ways. These are:

a) By NSDP in its headquarters,
b) By the University of Minnesota under grant or contract using input format specifications to create a raw data tape acceptable to NSDP file maintenance software, or
c) By a third party contractor as in b. above.

We have assumed here that such keyboarding would be performed by the University of Minnesota as provided in b. above.

After keyboarding, the input editorial correction data on magnetic tape acceptable as input to NSDP file maintenance software would be sent to NSDP for actual computer processing together with their performing acceptance checking of each record and its key-title, ISSN, etc. for formal acceptance into the NSDP system.

One final process will be required upon the NSDP computer processing. This involves the handling of the update control listings and handling updating errors and validation of the processing run. As above, this work could be handled in one of the three ways outlined. It would be best handled by the team that does the editorial work, as the process sometimes requires access to original data or to other persons who have performed the original work. Therefore, we have assumed this process would be performed by the University of Minnesota with the results of error handling resubmitted to NSDP for subsequent processing.

In outline, the method we are suggesting is to:

1. Investigate further the possible trade-offs of increasing automated processing (at a slightly higher cost) with the intent of lowering of manual costs.

2. Produce from the machine conversion stage using NSDP software, the initial listings for use by professional editors.

3. If possible, bring together with these listings the aperture card surrogate to aid the editorial task.

4. Perform the editorial work possible working from the *MULS* record information and the surrogate.

5. Keyboard the changed or added data, creating the input tape to the NSDP file maintenance software.

6. Perform the computer processing at NSDP together with acceptance checking of the essential ISDS data elements.

7. Perform the processing of the update control listings and the error listings and resubmit to NSDP.

2.C. Personnel and Costs of Manual Tasks

From the assumptions and methodology previously discussed, together with our knowledge of the MULS data and NSDP rules we propose that a one calendar year period will be required if seven professional librarians are used as editors. This estimate is based on an average editing rate of 40 titles per day per editor. This amounts to a total of 1385 man days for our base total of 55,416 unique titles. Only a few of these titles would be already in the NSDP system so the effect of this condition would be minimal if current conditions are considered. This man day total is close to 7 F.T.E. However, we are concerned that the 40 title per day average may be too high. If we lower the rate to 35 per day we have some safety margin as 7 F.T.E. is then almost the true F.T.E. as 1583 man days would be provided if this lower rate were used. 7 F.T.E. for 1 year is equal to 1680 man days according to University of Minnesota hours, holidays, and vacation allowances. Again we must caution that this personnel estimate is based upon using the MULS record, hopefully, with surrogate for this process, providing the essential ISDS data elements, essential National elements, and only whatever additional ISDS or National elements as can be readily determined from these sources.

In a similar manner we have considered the keyboarding problem and feel there would be some keyboarding required for all of the 55416 records, even if it amounted to only a single field. Again using our experiences in typing input to MULS we have determined that 480 man days or 2 F.T.E. appears reasonable. This is based on a rate of typing 115 mixed transactions daily per typist average, and working from the corrected or changed editorial proof listings for the most part.

We have also determined that two library assistants would be needed to process the update errors and also verify that the changes input were correctly processed. This rate has been established as identical to the typing rate from our experiences on the MULS project. However, if error handling alone were done this cost could be lowered considerably at the risk of having invalid data pass into the file through faulty computer processing.

Table 2.6 gives a detailed itemization of the costs and personnel required. An area has been provided for the addition of computer processing costs at NSDP which we did not feel we could accurately include without NSDP providing these cost figures for a 55,416 title processing volume.

An appendix issued separately from this report gives detailed information on the percentages of records according to their complexity to further support our estimates of editorial costs.

Table 2.1 FIELD CONTENT AND RULES OF MULS AND NSDP IN NSDP FIELD ORDER.

NSDP	MULS
Essential ISDS Elements 1-9	
1. Date of entry/amendment.-Set by computer	008 Date of entry - manually entered, form identical to NSDP.
2. Centre code- NSDP assigns	No equivalent field in MULS.
3. International Standard Serial No. (022)- NSDP assign, stored as in MARC.	022 ISSN - Entered where known, stored as in MARC.
4. Key-title (222) - NSDP assigns.	222 Key title - Not presently stored in MULS.
5. Varying form of title (246) - 1st indicator blank, otherwise same as MARC.-	246 Varying title - Not used by MULS, data may be found in an 809, 950 tag or a 500 note in the record.
6. Beginning date - last named year.	008 Beginning date - field present as in MARC but not filled in for most records.
7. Country of Publication Code - ISO Country Codes.	008 Country of publication - MARC codes (convertible by NSDP MARC CONVERSION Program to ISO Codes).
8. Original alphabet of title - According to NSDP this is same as Byte 33 of 008 fields in MARC-S.	008 Original alphabet of title - Not stored by MULS, and not shown in MARC-S Addendum 1 which blanks out Byte 33.
9. Imprint (260) - As in MARC, except $c date subfield not used.	260 Imprint - Identical to MARC and NSDP.
National Elements	
10. Author, Personal Name (700) - As in Marc, except includes all names associated with work, main and added. Uses $g - relationship dates subfield not in MARC. $t subfield not used.	700 Not used in MULS, main entry author stored as TAG 100 as in MARC. Added authors stored as 809 or 950 tags.
Author, Corporate Name (710)-as author, personal name above.	710 Not used in MULS, as above in MULS and MARC.
Author, Conference or meeting (711) -as author, personal name above.	711 Not used in MULS, as above in MULS and MARC.
*10(A) Title statement (245)-as in MARC.	245. title statement - as in MARC.
Other ISDS Elements	
11. Coden (030)-stored as in MARC	030 Coden-Not stored in MULS.
12. Publication status-as in MARC.	008 Publication status-as in MARC.
13. Type of serial designator-as in MARC	008 Type of serial designator - as in MARC, except for use of code c = continuation designating as serial item cataloged and shelved as a book.

*TAG 245 recently added to NSDP record, but its field position is not shown in our documentation.

NSDP	MULS
14. Ending date - filled in with last date or blank if currently published or end date unknown.	008 Ending date - as in MARC, but not filled in for most records. Blank if currrently published or end date unknown; i.e. identical to NSDP.
15. Frequency- as in MARC. Frequency (310) - as in MARC	008 Frequency- not stored in MULS. Occasionally frequency information found in a 500 field. 310 Frequency not used in MULS.
16. Language - MARC codes in fixed field.	008 Language - as in MARC.
Language (041) - full spelling of language used.	041 Language - as in MARC (convertible by NSDP MARC CONVERSION Program to full spelling).
17. L.C. Call No. (050) - as in MARC	050 L.C. Call No. - Not stored in MULS. Any call no. present is stored in 850 Holdings field as subfield $e.
Universal Decimal No.(080)- as in MARC.	080 UDC No.- Not stored in MULS
Dewey Decimal No. (082) as in MARC	082 D D No. - Not stored in MULS, note as under 050.
18. Abbreviated title (210) - as provided in MARC.	210 Abbreviated title - identical to NSDP rules but stored only in a few MULS records.
19. Former title (780)- as in MARC.	780 Former title - not used in MULS, but data may be in a 500. field.
20. Successor title (785)-as in MARC.	785 Successor title - not used in MULS, but data may be in a 500 field.
21. Original Language (759) - Not in MARC. Gives ISSN or key title of an orig. lang. pub. when record is for a translation.	759 Original Language - not stored in MULS.
22. Translation/other language ed. (769)- Not in MARC. Gives ISSN or key-title of translations available if record is for an original.	769 Translation/other language ed.- not stored in MULS.
23. Primary record (779)- Not in MARC. Gives ISSN or key-title of main series or parent record of pub. in hand.	779 Primary record. - Not used in MULS, but data may be found in a 500 field.
24. Subordinate record (789) - Not in MARC. Gives ISSN or key-title of a subseries, Suppl. or serial within serial of pub. in hand.	789 Subordinate record - not used in MULS, but data may be found in a 500 field.
25. ISDS related titles (787) - Not in MARC. Gives ISSN or key-title of any other related serial not covered in fields 759, 769, 779, 780, 785, 789.	787 ISDS Related titles - Not used in MULS, but data may be found in a 500 field.

NSDP	MULS
26. Indexing and Abstracting Coverage (510) - as in MARC.	510 Indexing and Abstracting Coverage - as in MARC except $b and $z subfields not used.
Other National Elements	
27. Beginning and Ending dates (362) as in MARC.	362 Beginning and Ending dates - Not used in MULS but sometimes may be found in a 5xx or in 008 field.
28. Library of Congress Card No. (010) as in MARC.	010 L.C. Card No. - as in MARC.
29. U.S. Supt. Doc. No. (086) - as in MARC.	086 U.S. Supt. Doc. No. - Not stored in MULS except possible in TAG 850 $e subfield if shelved under this no.
30. Title as it appears on piece (200)- NSDP uses only if different from key-title.	200 Title as on piece - MULS uses this as an unverified form of TAG 245.
31. NLM Call No. (060) - as in MARC.	060 NLM Call No. - Not stored in MULS
32. NAL Call No. (070) - as in MARC.	070 NAL Call No. - Not stored in MULS
33. General Note (500) - as in MARC, except used to include all notes.	500 General Note - as in MARC, except $z subfield not used.
Corporate Authority File No. (039)- internal to NSDP data base.	-Nothing comparable in MULS
Encoding Level - as in MARC.	-Not present in MULS.
	100, 110, 111 used by MULS as in MARC.
250 Edition - Treated as part of key-title if present and as subfield h in TAG 245.	250 Edition - used as in MARC.
Comparable notes, if present, stored as 500 field.	501 Bound with Note - as in MARC.
	502 Drawn from Dissertation Note - as in MARC monograph format.
	505 Contents note - as in MARC.
	515 Note on vols. and nos. - as in MARC.
	525 Note on supplements -as in MARC
	555 Note on cumulative indexes - as in MARC
	809 Added entry tracing -MULS defined.
	950 Cross reference tracing -MULS defined.

Figure 2.2

CONTROL NUMBER: 00-35467 ENC: NST: DCL73699241
LC: 2 NAL: NLM: OTHER:

ESSENTIAL ISDA DATA

DATE OF ENTRY:	730929
CENTRE CODE:	1
ISSN:	0091-374X
KEY TITLE:	Journal of research of the U.S. Geological Survey
VARIANT TITLE:	
START DATE:	1973
COUNTRY:	usa
ALPHABET OF TITLE	a
IMPRINT	Washington, For sale by the Supt. of Docs., U.S. Govt. Print. Off.

NATIONAL DATA

AUTHOR ENTRIES:	1. United States. Geological Survey.
CATALOGING TITLE:	Journal of research.

OTHER ISDS DATA

CODEN:	
PUBLICATION STATUS:	c
TYPE PUBLICATION:	p
END DATE:	
FREQUENCY:	b
LANGUAGE:	eng
DDC NUMBER:	557.3/05
ABBREVIATED TITLE:	1. J RES US GEOL SURV
FORMER TITLE(S):	
	NO ISSN: Geological survey research
	SUPERSEDED IN PART
SUCCESSOR TITLE(S):	
OTHER LANG ED OF:	
HAS OTHER LANG ED:	
INSET OR SUPPL TO:	
HAS INSET OR SUPPL:	
RELATED TITLE:	
ABSTRACTING SERVICE:	

OTHER NATIONAL DATA

DATE AND VOLUME:	v. 1 - Jan./Feb. 1973-
LC CARD NUMBER:	73-699241
US SUPT DOC NUMBER:	
TITLE ON PIECE:	
NOTES	

ADDED RECORD

* = CHANGED B = ADDED ! = DELETED

Figure 2.3

CONTROL NUMBER: 00-35238 ENC: NST: DLC73643869
LC: 2 NAL: NLM: OTHER:

ESSENTIAL ISDA DATA

DATE OF ENTRY:	730929
CENTRE CODE:	1
ISSN:	0091-3715
KEY TITLE:	Political science reviewer
VARIANT TITLE:	
START DATE:	1971
COUNTRY:	ucs
ALPHABET OF TITLE:	a
IMPRINT:	Hampden-Sydney, Va.

NATIONAL DATA

AUTHOR ENTRIES:	
CATALOGING TITLE:	The Political science reviewer
	MAIN ENTRY

OTHER ISDS DATA

CODEN:	
PUBLICATION STATUS:	c
TYPE PUBLICATIONS:	
END DATE:	
FREQUENCY:	a
LANGUAGE:	eng
DDC NUMBER:	320/.05
ABBREVIATED TITLE:	1. POLIT SCI REV
FORMER TITLE (S):	
SUCCESSOR TITLE(S):	
OTHER LANG ED OF:	
HAS OTHER LANG ED:	
INSET OR SUPPL TO:	
HAS INSET OR SUPPL:	
RELATED TITLE:	
ABSTRACTING SERVICE:	

OTHER NATIONAL DATA

DATE AND VOLUME:	v. 1- 1971-
LC CARD NUMBER:	73-643869
US SUPT DOC NUMBER:	
TITLE ON PIECE:	
NOTES:	

ADDED RECORD

* =CHANGED B=ADDED !=DELETED

Figure 2.4.

CONTROL NUMBER: 00-9393 ENC: 1 NST: NAL73040602
LC: NAL: NLM: OTHER:

ESSENTIAL ISDS DATA

DATE OF ENTRY:	730502
CENTRE CODE:	1
ISSN:	0013-9432
KEY TITLE:	Enzyme
VARIANT TITLE:	1. Journal of enzyme physiology and pathology
START DATE:	19??
COUNTRY:	sch
ALPHABET OF TITLE:	a
IMPRINT:	Basel, München, Paris, London, New York, Sydney, S. Karger

NATIONAL DATA

AUTHOR ENTRIES:	
CATALOGING TITLE:	

OTHER ISDS DATA

CODEN:	
PUBLICATION STATUS:	c
TYPE PUBLICATION:	p
END DATE:	
FREQUENCY:	b
LANGUAGE:	eng
ABBREVIATED TITLE:	
FORMER TITLE(S):	NO ISSN: Enzymologia biologica et clinica IS CONTINUED
SUCCESSOR TITLE(S):	
OTHER LANG ED OF:	
HAS OTHER LANG ED:	
INSET OR SUPPL TO:	
HAS INSET OR SUPPL:	
RELATED TITLE:	
ABSTRACTING SERVICE:	

OTHER NATIONAL DATA

DATE AND VOLUME:	
LC CARD NUMBER:	
US SUPT DOC NUMBER:	
TITLE ON PIECE:	
NAL CALL NUMBER:	QP601.E52
NOTES:	

Figure 2.5.

CONTROL NUMBER: 00-35610 ENC: 1 NST: NAL73071662
LC: NAL: 3 NLM: OTHER:

ESSENTIAL ISDS DATA

DATE OF ENTRY:	730929
CENTRE CODE:	1
ISSN:	0033-0124
KEY TITLE:	Professional geographer
VARIANT TITLE:	
START DATE	1949
COUNTRY:	usa
ALPHABET OF TITLE:	a
IMPRINT:	Washington, Association of American Geographers

NATIONAL DATA

AUTHOR ENTRIES:	1. Association of American Geographers
CATALOGING TITLE:	The professional geographer. MAIN ENTRY

OTHER ISDS DATA

CODEN:	
PUBLICATION STATUS:	c
TYPE PUBLICATION:	p
END DATE:	
FREQUENCY:	q
LANGUAGE:	eng
ABBREVIATED TITLE:	1. PROF GEOGR
FORMER TITLE(S):	
SUCCESSOR TITLE(S):	
OTHER LANG ED OF:	
HAS OTHER LANG ED:	
INSET OR SUPPL TO:	
HAS INSET OR SUPPL:	
RELATED TITLE:	
ABSTRACTING SERVICE:	

OTHER NATIONAL DATA

DATE AND VOLUME:	Begun publication in 1949. cf. Ulrich's international periodicals direct., 1971/72.
LC CARD NUMBER:	
US SUPT DCC NUMBER:	
TITLE ON PIECE:	
NAL CALL NUMBER:	G1.P7
NOTES:	1. "Forum and Journal of the Association of American Geographers."

ADDED RECORD

Figure 2.2.A

```
ID:0-0758219 TD:730619 CP:0 MR:  CT:dcu LN:eng BD:1973 ED:     CS:x TH:   NC.    PS:c TS:p GP:f PM:
     LOH 1315
     MEC  0$aUnited States.$bGeological Survey.‡
     TAP 00$aJournal of research.‡
     IMP 01$aWashington, D.C.‡
     KEY   $aUNITED-STATES.-GEOLOGICAL-SURVEY.*JOURNAL-OF-RESEARCH.*WASHINGTON,-D.C.‡
     HOL   $aMnManSC$bMSC$c$dV.1-    (1973-    ).$eI 19.61‡
```

Figure 2.3.A.

```
ID:0-0597477 TD:730615 CP:0 MR:  CT:vau LN:eng BD:1971 ED:     CS:x TH:  NC:  PS:c TS:c GP:  PM:
     LOH 0129
     TAP 00$aPolitical science reviewer.‡
     IMP 01$aHampden-Sydney, Va.,$bHampden-Sydney College.‡
     KEY   $aPOLITICAL-SCIENCE-REVIEWER.*HAMPDEN-SYDNEY,-VA.,-HAMPDEN-SYDNEY-COLLEGE.‡
     HOL   $aMnU$bPER$c$dV.1-    (FAL1971-    ).‡
```

Figure 2.4.A.

```
ID:0-0244975 TD:730115 CP:0 MR:  CT:sz LN:eng BD:    ED:    CS:s TH:    NC:    PS:c TS:p GP:   PM:
     LOH 0201  0301
     SSN   $a0013-9432‡
     TIL 00$aEnzyme.‡
     IMP 01$aBasel,$bKarger.‡
     KEY   $aENZYME.*BASEL,-KARGER.‡
     NOG   $aTitle varies: volumes 1-11, Enzymologia biologica et clinica.‡
     NOG   $aVolumes 1-11 in various languages; volume 12-    in English.‡
     HOL   $aMnU-A$bBCH$c$dV.1-    (1961-    ).‡
     HOL   $aMnU-B$bB$c$dV.12-    (1971-    ).‡
```

Figure 2.5.A.

```
ID:0-0607186 TD:730605 CP:0 MR:  CT:nyu LN: eng BD:    ED:  CS:m TH:  MC:  PS:c  TS:p GP:  PM:

     LOH 0129  0504  1109  1315  1318  1325  1401
     LCN   $a52-48680‡
     SSN   $a0033-0124‡
     TIL 04$a The Professional geographer.‡
     IMP 01$a  New York.‡
     KEY   $a PROFESSIONAL-GEOGRAPHER.  *NEW YORK.‡
     NOG   $aOrgan of the American Society for Professional Geographers (called American Society
               for Geographical Research).‡
     NOG   $aTitle varies:  Oct. 1945, Bulletin of the American Society for Professional Geographers.‡
     NOG   $aAbsorbed the Joint newsletter of the Association of American Geographers and the
               American Society for Professional Geographers, in 1949.‡
     NOS   $aVol. 1 was a supplement:  Directory of the members and associates of the Association
               of American Geographers;  constitution of the association.‡
     NOI   $aIndexes:  1946-66, in v. 18-19.‡
     AET  1$a 0054400‡
     AET  1$a 0085336‡
     HOL   $aMnU  $bPER$cdV.  3inc.;  v.4-21;  v.22inc.  (1951-    ).‡
     HOL   $aMnU-D$bDUL$c$dV. 10-    (1958-    ).‡
     HOL   $aMnSM$bMAC$c$dV. 16-    (1964-    ).‡
     HOL   $aMnMan$C$bMSC$c$dV.1-    (1949    ). issues missing. $eG  3.P7‡
     HOL   $aMnMohSC$bMOO$c$dV. 21-    (1969-    ).‡
     HOL   $aMnStcL$bSCL$c$dV. 1-2, 9-10, 14, 17-    (1949-    ).‡
     HOL   $aNdFA$bNDS$c$dV. 1, 20-    (1949, 1968-    ).‡
```

TABLE 2.6 Costs of Editorial Tasks

Function	Personnel/No.	Salary	Time(mos.)	Direct Costs	Direct Costs per Title	Indirect Costs	Indirect Cost per Title
Editing	Catalog Librarian (7)	12,000 yr.	12 mos.	$84,000	$1.52		
Fringe benefits @17.5%						$14,700	
Indirect costs @45.5%						38,220	$ .96
Data Entry/Key-boarding	Sr. Clerk/Typist (2)	6,600 yr.	12 mos.	13,200	.24		
Fringe Benefits @16.5%						2,178	
Indirect costs @45.5%						6,006	.15
	MT/ST rentals (2) @ $280 mo.	3,360	12 mos.	6,720	.12		
	Supplies		12 mos.	1,000	.02		
Update/Computer error check-ing / handling	Library Assist. (2)	8,160 yr.	12 mos.	16,320	.29		
Fringe benefits @16.5%						2,692	
Indirect costs @45.5%						7,424	.18
Supervision and Organization	Project Director	15,000 yr.	12 mos.	15,000	.27		
Fringe benefits @17.5%						2,625	
Indirect costs @45.5%						6,825	.17
NSDP Computer Processing	Figures for such processing would have to be determined by NSDP.						
		Totals		$136,240	$2.46	$80,670	$1.46

AREA 3. PROVISION OF SURROGATES

Contract requirement

"Provide quantitative estimates of the personnel and processing costs required to produce aperture card surrogates, according to NSDP specifications, for all of the titles in the machine-converted file."

3.A. INTRODUCITON TO THE PROBLEM

The geographic spread in the locations of titles composing the MULS data base creates a complex logistics problem in that:

1) a clustering of titles together locally can reduce costs,
2) an original must be filmed at the site due to varying circulation and shelving regulations of the respective libraries, and
3) a consideration of the above makes it advisable that more than one filming/aperture card production system be used even though more expense may be associated with the method.

To determine personnel and processing costs for this area requires that a methodology be developed. This methodology should strive to efficiently address the logistics problem and thereby lower the cost - particularly the cost associated with location of the original and the labor of filming it.

In studying the problem the data base itself was used to determine characteristics about the geographic problem. From this information we were able to determine that:

1) the University of Minnesota holds 45,751 of the 55,416 titles on the file as of July 16, 1973,
2) 72 locations in the Twin Cities should produce originals for almost 90% of the total file, and
3) non-Twin Cities locations hold 10% of the originals or about 5,500 titles.

The above indicated to us that in developing the methodology we concentrate on the most efficient means to do the 90% of the file locally available. The costs for the remaining 10% would be similar to those above plus travel time costs, mileage or rental car expenses, and per diems outside of the Twin Cities.

Another factor complicates the actual activity of securing originals for microfilming. This is the use of off-site storage by some of the libraries. There is a manner in which this factor can be efficiently handled in the case of the University locations - as this storage is centralized within the Walter Library stack area for the subject collections of the University's library system.

3.B. DETERMINING THE METHOD

In order to design a method to do the filming, then to cost the method, we have assumed that each library's staff would be minimally involved - only to the extent of directing the filming personnel as to the location of materials, or helping locate any missing items. Another basic assumption was that at least for the 90% of the data base available locally, filming would be carried out on site: The size of a site would be a determining factor in deciding whether an automatic camera/processor or a portable camera with later service bureau film processing would be used for the filming.

Without a special computer program it is not now possible to determine the precise location of the 10% of the file unique to the out-state area and the nature of these titles. They may be obtainable in another large metropolitan library such as in Washington, D.C. However, to determine some idea of cost to film these we have developed mileage and travel time data for each out-state location. The Table 3.3 in Section 3.6 gives these figures. Figure 3.4 shows a map of the sites. We have included in our study figures for trips to all of these sites to give a maximum expenditure figure.

Consideration of a centralized method over a decentralized on-site approach was made but the problems of removal of journals from the libraries were many, together with the problem of safe transport of large numbers of them: Therefore, this method has not been costed as we cannot recommend its use.

3.C. RECOMMENDED METHOD

The recommended on-site filming method is actually composed of two different filming techniques. At the major sites on the University campus an automatic camera/processor is recommended. At the minor sites, a portable camera with service bureau film processing is recommended. Otherwise, the method requires the same stages up to the point of filming.

The method may be broken down into a series of tasks each of which must be carried out in its proper sequence. The sequence of tasks is:

1. Production of optimized finding lists from the MULS data base for each location.
2. Selecting/Training filming crew.
3. On-site work procedures.
4. Service Bureau aperture card production.
5. NSDP Aperture card processing after ISSN/Key title assignment.

Each of these tasks is discussed in detail in the following sections of this report. The costs and personnel required for each task is presented and summarized in Figure 3.5.

Although the automatic camera/processor approach is more costly, it has the advantage of producing a finished aperture card which can be inspected and if not acceptable the item can be refilmed immediately. It also avoids the administrative problems coincident with the film processing and mounting operation.

3.C.1. TASK 1. FINDING LIST PRODUCTION

The MULS data base would be processed by a special program to produce finding lists for each potential location. When duplicate locations for a title exist, the program would optimize its first choice of location by choosing the site from a table. This table of locations would be constructed by considering the physical location, size, potential duplication, and ease of working conditions so that the first location would be that considered most desirable.

Preliminary investigation of such a scheme has been done on the number of titles held at the University of Minnesota locations versus the number held at non-University locations. Figure 3.1 shows this distribution as of July 16, 1973, when 55,416 titles were in the data base.

Other factors, such as off-site storage use, holding characteristics of the location (holds only current, or sporadic issues) or cooperativeness of the staff could also affect the optimization of the locations to some degree.

As part of this investigation we have run a manual test of such an optimization of locations and are satisfied that the method is practical and could be fully developed.

Also, in order to cost this portion of the method we have pursued the design specifications for the list. The list must enable a person to page the original at the most desirable site, to make conclusive identification of the title and impart that identification so that the film, as exposed, will be able to be definitively matched to the machine converted data base.

The listed specifications are:

1) Use of a form with a vertical perforation 3" from the right hand edge and horizontal perforations every inch starting at the top.
2) Display of record I.D. and any existing ISSN on first line.
3) Display of first 120 characters of TAG 100, 110, 111 on second line.
4) Display of first 120 characters of TAG 200 or 245 on third line.

5) Display of first choice or only location available and holdings data including any call numbers on the fourth line.
6) Display of a secondary choice location if such exists on the fifth line.
7) Display of the record I.D. number on the third line of the perforated area to the right of each six line data block on the form.

The perforated strip would be torn off and placed with the item to be filmed. The camera operator in turn would lay the strip on the page being filmed so that each exposure of a title page would be identified to the machine converted file. Table 3.C.1 gives the direct and indirect costs of this task.

TABLE 3.C.1.

Direct Costs	Amount	Indirect Costs	Amount
Programer/Analyst		Fringe benefits @ 16.5%	$330
5 man weeks @ $10 hr=200 hr.	$2,000	Indirect costs @ 45.5%	910
Computer time-30hrs.@ $70 hr.	2,100		
Forms 6,000sheets (3 cartons)	150		
Direct total	$4,250	Indirect total	$1,240
Direct cost per title	$.08	Indirect cost per title	$.02

Grand total $5,490
Total cost per title $.10

3.C.2 TASK 2 SELECTING/TRAINING FILMING CREW

After the finding lists were generated a precise determination of the order of filming would occur. It would be expected that this order would be from most desirable to least desirable according to the picking list location table. Therefore, these organizational matters would be handled concurrently with equipment procurement and selection and training of the filming crew.

Personnel would be recruited under University of Minnesota Civil Service regulations on temporary appointments for the duration of the filming process. Full-time personnel are proposed so that training and supervision costs can be kept to a minimum and the total filming task accomplished in a reasonable overall time period. Table 3C.2 gives the direct and indirect costs of this task.

TABLE 3.C.2

Direct Costs	Amount	Indirect Costs	Amount
Training Librarian			
80 hrs. @ 7.00 hr.	$ 560		
Supervision/scheduling Librarian		Fringe benefits @ 17.5%	$294
160 hrs. @$7.00 hr.	1120	Indirect costs @ 45.5$	765
Job descriptions/posting,			
supplies, adv. fee	100		
Film/Aperture cards supplies	500		
Direct total	$2,280	Indirect total	$1,059
Direct cost per title	.04	Indirect cost per title	.02

Grand total $3,339
Total cost per title $.06

3.C.3 TASK 3 ON-SITE WORK PROCEDURES

For the 90% of titles located in 72 Twin Cities locations the on-site work procedures will involve:

1) retrieval and replacement of original documents from stock locations,
2) camera operation, and
3) handling problem documents not located immediately or found to be on a list in error.

For the 10% of the titles not found in the Twin Cities an additional procedure will be involved. This is travel to the site. In the case of these locations, a rental car or mileage would have to be paid, the travel time at full hourly salary, and any per diem expenses of overnite lodging.

There is travel time involved for the Twin Cities locations but it would be minimal, as at least one day would be required to perform the work at any site. Therefore, no provision for time or mileage locally has been made in these personnel and cost estimates.

The work procedures involved in retrieving and reshelving originals ideally should proceed at the same rate as the ability to operate the camera. Therefore, we have investigated this process through a trial retrieval in the Bio-Medical Library at the University performed by the Project Officer. Also, librarians who supervise shelvers and shelvers themselves were observed. This investigation certainly could not replicate all of the same conditions as would be present in the actual process as we perceive it. However, it is our opinion that these estimates can be used reliably at this time for costing, but that some percentage should be figured as an insurance against predominance of worst case conditions. The retrieval as perceived would involve mostly close proximity items which would tend to enhance the amount retrieved per hour. But, lack of familiarity with the stacks, varying stack orderliness, and arrangement could offset this enhancement. Therefore, the retrieval rate we will use is 60 titles per hour although from 50 to 80 seemed to be possible in the above investigation.

The reshelving rate varied between 100 to 150 per hour, again depending upon proximity to one another and general condition of orderliness and familiarity. Therefore, the reshelving rate we will use will be 120 per hour or twice the retrieving rate.

This means that one person performing this function would be slightly behind in replacing items after filming. However, this is preferable to having another person full or part time paid to pick up the equivalent of 30-60 minutes of time.

The next matter to investigate would be the production rate of the camera operator so that one could decide if the retrieval and reshelving process would keep pace. The production rate in camera operation is influenced by the nature of the camera and its adjustments.

From the statistics of the holdings locations in MULS we determined that two types of cameras would be required. In the major sites where high volumes occur we recommend the 3M Company 2000 aperture card camera/processor. This device automatically produces an aperture card in finished form in a 40 second processing cycle. There are five Twin Cities University locations: Wilson Library, Walter Library, Law Library, Bio-Medical Library, and St. Paul Campus Library in which a unit could be installed and then moved to the next location. These locations hold in aggregate approximately 30,000 titles. One other potential site would be the Minnesota Historical Society Library in St. Paul with 3956 titles uniquely held - many of which are newspapers able to be handled by this device. The camera/processor would be equipped with the 14.5 to 1 reduction ratio optics, producing an aperture card deemed acceptable, although not of the 12 to 1 ratio in the NSDP specifications.

In the minor sites which, in aggregate, comprise the remaining 25,416 titles but which individually number from a dozen to several thousand titles, we propose the use of a portable camera. We propose use of a Gordon 35 (Koni-Omega) camera for minor sites which is quite portable yet giving acceptable image quality.

Production rates for each of these cameras were determined through discussions with the 3M Co. representative for that device and with Mr. Elmo Brekhus, Assistant Professor, Library School, University of Minnesota. Mr. Brekhus was formerly Project Director of the Diabetes Information Retrieval Project (DIADOCS) in the University's Anatomy Department and is an expert on microfilm systems. Through data supplied by him, filming rates for both the 3M.2000 and portable camera have been established at 50 titles and 40 titles per hour respectively. This would mean that in an 8 hour period, allowing for breaks and equipment servicing a daily rate of 350 titles for the 3M 2000 camera and 280 titles for the portable camera.

The 3M 2000 unit offers the advantage of producing a finished aperture card, which if not acceptable, can mean an immediate refilming of the title. The portable camera merely exposes the film, necessitating off-site developing and mounting into the aperture cards, inspection and then rejection of any not found acceptable. This would necessitate returning to the site to film any rejected or separately transporting those items to the 3M 2000 unit for refilming.

Since the retrieval rate is in excess of the filming rate it would appear that a two person filming crew would be best. One person would retrieve and reshelve with the other filming. In the major sites using the 3M 2000 method, any work arrearage would occur on the returning to the shelves, as the filming rate is closer to the picking rate assuming priority is given to picking, thereby assuring ample work for the camera operator. Table 3C.3. shows direct and indirect costs for major and minor sites and additional out of Twin Cities costs.

In Table 3.C.3. we have figured the on-site costs for the filming of the 10% of the MULS data base not available in the Twin Cities. However, additional costs of travel time, mileage and overnight expenses would have to be added to cover approximately 5500 titles. Because we do not know the precise distribution of these titles we can only assume they are held by the larger libraries. This total represents 20 days work for the filming crew if considered as an aggregate. Therefore to give some approximation of these costs we have included a table in Section 3.6 giving mileage and travel time by automobile to the cities containing the library locations listed by location number and a map to show the relationship of the sites to the Twin Cities.

The total mileage and time involved if each ite had to be visited would be 5662 miles @ $.10 per mile or a cost of $566.20 and 110.6 hours for 2 persons @ $2.53 per hour for a total cost of $279.82.

University travel regulations allow a per diem in-state of $20.00 per day except in in-state cities of over 100,000 where the per diem is $32.50. If all sites far enough away were visited on an overnight basis this would involve 18 days lodgings each for 2 people or $520 on the $20.00 daily rate. Duluth is the only city visited where the $32.50 per diem applies so the cost would be essentially that of the lower rate. Table 3.C.3 and 6 shows these additional costs for the out-state libraries.

TABLE 3.C.3

Direct Costs	Amount	Indirect Costs	Amount
MAJOR SITES (30,000 titles)			
Film crew - Sr. Clerk & Camera operator @ $2.53 per hr. each for 86 days	$ 3,481	Fringe benefits @ 16.5%	$ 634
		Indirect costs @ 45.5%	1,749
Error refilming 10% or 3000 titles @ 350 per day	364		
3M 2000 Camera purchase	7,423		
Maintenance agreement	550		
Camera installation/cartage to 5 locations @ $25.00	125		
Aperture cards & supplies $85.80 per m. for 35,000 & $2.10 per qt. developer for 175 qts.	3,370		
Major site subtotal	$15,313	Major site indirect subtotal	$2,383
Maj. site per title subtotal	$.51	Maj. site per title indirect subtotal	$.08
MINOR SITES (25,416 titles)			
Film crew as above for 91 days	3,684	Fringe benefits @ 16.5%	$ 668
		Indirect costs @ 45.5%	1,842
Error refilming 10% or 2,541 titles @ 280 per day	364		
Film/supplies 50 reels 35 mm. @ $7.54 each = $377	500		
Gordon 35 Portable camera	1,395		
Minor site subtotal	$5,943	Minor site indirect subtotal	$2,510
Min. site per title subtotal	$.23	Minor site per title indirect subtotal	$.10
OUT-STATE LIBRARIES COSTS			
Mileage @ $.10 per mile	566	Fringe benefits @ 16.5%	$ 46
Travel time @ $2.53 hr.	280	Indirect costs @ 45.5%	127
Per diem expenses	520		
Outstate subtotals	$1,366	Outstate indirect subtotal	$ 173
Outstate per title subtotal	$.25	Outstate per title indirect subtotal	$.03
Total Direct Costs	$22,622	Total indirect costs	$5,066
Total direct per title costs	$.42	Total indirect per title costs	$.09

Grand Total $27,588
Total cost per title $.50

If this work proceeded immediately after the machine conversion, the supervision of this activity would be performed by the project director concurrently with the editorial work supervision. If this were done, no additional supervisory charges would be incurred. However, if this were not the case, a project director would be required for 4.5 months. Direct and indirect costs would be:

Direct Costs	Amount	Indirect Costs	Amount
Project director salary $1250 month	$5,625	Fringe benefits @17.5%	$ 985
		Indirect costs @45.5%	2559
Direct total	$5,625	Indirect total	$3,544
Direct per title total	$.10	Indirect per title total	$.07

Grand total $9,169
Total cost per title $.17

3.C.4 TASK 4. SERVICE BUREAU APERTURE CARD PRODUCTION

This task applies only to those titles handled by the portable camera. The work of this stage involves developing the exposed 35 mm rolls of film and then mounting each frame in an aperture card.

Northwest Microfilm, Inc., a large microfilm vendor which in the past has been successful bidder on University of Minnesota work quoted a price of $.10 each including developing, inspection and mounting. On a 25,541 card basis this total is $2554.10.

In order to determine if this commercial rate seemed reasonable we secured the necessary information to enable us to cost an in-house operation. Table 3.C.4 gives the in-house cost for aperture card production.

TABLE 3.C.4 Aperture Card Production--In-house

Direct Costs	Amount	Indirect Costs	Amount
Photographic assistant 63 hrs. @ $2.53 hr. (mounting 400 frames per hr.)	$ 162	Fringe benefits @ 16.5%	$ 27
		Indirect Costs @ 45.5%	
Developing 50 rolls of film commercially @ $2.55 each	127		
3M Co. Model 038 Roll to Card Mounter (reconditioned)	395		
Service on Mounter	40		
Aperture Cards 26m @$17.00	442		
Direct processing costs total	$1,166	Indirect costs total	$101
Per title cost total	$.045	Indirect per title total	$.005

Grand total $1,267
Total per title $ .05

Adding the per title cost of minor site filming of $.23 gives a minor site cost total of $.28 per title using in-house aperture card production or $.33 per title using commercial production.

From the above it is apparent that the service bureau charges are over twice what an in-house operation would cost. Yet, one may wish to avoid such an operation merely to streamline the process from an administrative viewpoint. However, we have included this analysis so that a logical choice could be made later. In the cost summary we will use the higher figure to figure the total costs.

Although not specified we have also costed the creation of a duplicate set of aperture cards for the data base in the event that NSDP wishes more than one or Minnesota also wishes a set. This cost on a service bureau basis for 70,000 aperture cards was quoted at from $.10 to $.15 each ro $7,000-$10,500 total. Also, to see how reasonable this charge was we costed an in-house operation. Table 3.C.4.1 below gives the in-house direct and indirect costs for aperture card duplication.

TABLE 3.C.4.1 APERTURE CARD DUPLICATION--In-house

Direct Costs	Amount	Indirect Costs	Amount
Photographic assistant 350 hrs @ $2.53 hr. (200 per hr. rate)	$ 885	Fringe benefits @ 16.5%	$146
		Indirect Costs @ 45.5%	402
3M Co. Model 086 Dupliprinter (recond.)	395		
Maintenance	135		
Duplicards @ $16 per m	1,120		
Direct cost total	$2,535	Indirect cost total	$548
Direct per title cost	$.05	Indirect per title cost	$.01

Grand total $3,083
Per title total $.06

Again, the in-house cost represents a substantial savings over the service bureau and could be recommended for this work volume as an alternative to a service bureau.

3.C.5. TASK 5 NSDP APERTURE CARD PROCESSING

The aperture cards created from the MULS data base titles would accompany the machine converted file to NSDP where the staff would examine the bibliographic data and surrogate. The ISSN and key title would then be assigned necessitating the keypunching of this data into the supplied aperture cards. We have made an estimate here of the work involved using University of Minnesota rates as a guide. NSDP's rates would have to be substituted based on their experiences.

Without knowing the skill or the pay rate of the individuals involved the following costs for keypunching are being included so that some estimate of this phase would have been made. In this manner a total cost and a cost per title for the MULS surrogates can be more accurately derived.

Conservative keying rates have been used, as a measure of extra care would be required to reduce the need for creating new aperture cards because of improper punching or using self-sticking key punch repair labels on the improperly punched cards (which may not be acceptable). The following specifications were used to derive these costs:

1) 75 key strokes per minute or 60 cards per hour for punching,
2) 3% error rate requiring either repair or punching of a new card,
3) key verification of ISSN information on each card only at 75 key strokes per minute for a total of 60,000 keystrokes on 70,000 cards.

Key punching 70,000 cards @ 60 per hr. = 1167 hrs. @$2.76 per hr.		$3,221.00
Verification 70,000 cards = 560,000 keystrokes @ 75 per min. = 125 hrs. @$2.76 per hr.		345.00
Error card processing 2100 cards @ 60 per hr. = 35 hrs. @ $2.76 per hr.		97.00
	Labor total	$3,663.00
Labor cost per card = $.052		
8 mos. key punch rental @ $82.00 per month		$ 656.00
	Total	$4,319.00
Total cost per card = $.062		

3.C.6. PROVISION OF SURROGATES - Supplemental Figures

Figure 3.1 MULS Distribution of Holdings Codes with number of Titles also held by University of Minnesota and Total Number of titles for each location.

Figure 3.2 Holdings in High Volume or major locations for automatic camera/processor method.

Figure 3.3 Out-state Locations Mileage and Travel Time by Automobile

Figure 3.4 Location Map of Libraries in MULS outside the Minneapolis-St. Paul area.

Figure 3.5 Cost Summary Table.

Figure 3.1
MULS-Distribution of Holdings Codes

Library	Code No.	U of M	Total	Non-U of M held
U of M				
Archives	0101	112	112	
*Ames	0102	626	626	
Arch.	0103	214	214	
Art	0104	347	347	
*BA & Bus. Ref.	0105	303	303	
*J.F. Bell	0106	5	5	
*Bibl. Coll.	0107	393	393	
Chem.	0108	598	598	
College Lib.	0109	221	221	
*Doc.	0110	1172	1172	
*East Asian	0111	621	621	
Educ.	0112	2338	2338	
Engineering	0113	1785	1785	
Pharmacy	0114	361	361	
Geology	0115	950	950	
Immig. Arch.	0116	67	67	
Kerlan	0117	4	4	
*Listening Rm.	0118	3	3	
Mines	0119	1012	1012	
Mathem.	0120	345	345	
*Middle East	0121	70	70	
Music	0122	229	229	
*Map	0123	62	62	
Nat. Hist.	0124	637	637	
*Newspaper	0125	816	816	
Pub. Admin.	0126	66	66	
*Pamphlet	0127	3	3	
Physics	0128	467	467	
*Periodical Div.	0129	9853	9853	
*Reference	0130	609	609	
SWH Arch.	0131	6	6	
Tech. Coll.	0132	1186	1186	
*Wilson G.C.	0133	3106	3106	
XX Cat. Sep.	0134	1254	1254	
*Y	0135	235	235	
*Z	0136	400	400	
St. Paul Campus				
Bio-Chem.	0201	246	246	
Entomology	0202	1032	1032	
Forestry	0203	860	860	
Plant Pathol.	0204	163	163	
St. Paul	0205	3832	3832	
Veterinary	0206	1027	1027	
Bio-Med	0301	5982	5982	
Crookston	0401	673	673	
Duluth Campus				
Biology	0501	120	120	
Chem.	0502	75	75	
Geol.	0503	86	86	
Duluth Main	0504	1804	1804	
Physics	0506	72	72	
Law	0601	7300	7300	
Morris	0701	698	698	
Waseca	0801	255	255	
State of Mn.				
Corrections	0902	60	78	18
Education	0913	331	387	56
Health	0914	462	1060	598
Highways	0915	106	185	79
Law	0916	1236	1405	169
Lib. Div.	0917	111	136	25
Legislative	0918	297	547	250
Planning	0920	75	99	24
Voc. Rehab.	0922	44	62	18
Welfare	0923	119	160	41
Glenn Lake	0924	49	53	4
Braille Faribault	0925	3	3	0
Deaf "	0926	2	3	1
St. Hosp.Brain.	0927	21	29	8
" Moose Lake	0928	30	35	5
" Fergus	0929	22	26	4
" Cambridge	0930	20	23	3
" Wilmar	0931	48	54	6
" St. Peter	0932	55	60	5
" Faribault	0933	45	58	13
" Rochester	0934	23	24	1
" Anoka	0935	40	40	0
" Hastings	0936	25	26	1
Hist. Soc.	1001	1541	5497	3956
CLIC				
Augsberg	1101	700	807	107
Bethel	1102	592	665	73
St. Catherine	1104	1265	1563	298
St. Thomas	1105	1276	1538	262
Concordia	1106	464	582	118
Hamline U.	1107	987	1163	176
J.J. Hill	1108	1414	1598	184
Macalester	1109	1966	2256	290
Mpls. Pub. L.	1201	3147	4619	1472
State Colleges				
Bemidji	1304	1593	1790	197
Carleton	1305	41	398	357
St. Benedict	1306	1	1	0
St. Theresa	1308	1	7	6
Concordia Moor.	1309	1118	1377	259
Gustavus A.	1313	730	1194	464
Mankato	1315	3931	5282	1351
Moorhead	1318	1749	2087	338
St. Cloud	1325	1768	2170	402
St. Johns	1328	9	16	7
So. West Marsh.	1329	817	1011	194
Winona	1331	678	782	104
Bethany Mankato	1334	56	97	41
No. Dak.St. U.	1401	3473	4213	740
VA Hosp. Fargo	1402	84	85	1

*All in Wilson taken together 17,651

Figure 3.2
Holdings in High Volume (Major) Locations and University Sites

MAJOR LOCATIONS

Wilson Library Units		Walter Library Units		St. Paul Campus Units		Law Library		Bio-Medical Library	
Local Code #	No. Titles								
0102	626	0101	112	0205	3832	0601	7300	0301	5982
0105	303	0104	347	0202	1032				
0106	5	0108	598	0206	1027				
0107	393	0112	2338	0203	860				
0110	1172	0132	1186	0201	246				
0111	621	0109	221	0204	163				
0118	3	0117	4						
012	70	0122	229						
0123	62								
0125	816								
0127	3								
0129	9853								
0133	3106								
0135	235								
0136	400								

Totals	Wilson		Walter	St. Paul	Law	Bio-Med
	17668		5035	7160	7300	5982
Adjusted totals (for 40% storage of Wilson in Walter)	10,601	(Wilson 40%)	7067			
		Adj. Total	12102			

GRAND TOTAL TITLES	43,145
minus 30% est. duplication	-12,944
Total major site unique titles	30,201

MINOR LOCATIONS

Minneapolis Campus Units		Mpls. Campus Units (Cont.)		Other Campus Units	
0103	214	0120	345	0101	673
0113	1785	0124	637	0501-0506	2157
0114	361	0126	66	0701	698
0115	950	0128	467	0801	255
0116	67	0131	6		
0119	1012	0134	1254		
Minneapolis Total			7164	Other Total	3783

GRAND TOTAL UNIVERSITY MINOR LOCATIONS 10,947

Figure 3.3
Out-State Locations Mileage and Travel Time by Automobile

		Local Code #	Miles	Time (hrs.)
Minneapolis to	Duluth	0503,0506,1307 0504,0501,0502	154	3
	Crookston	0401	290	6
	Morris	0701	152	3
	Waseca	0801	80	1.5
	Glenn Lake	0924	20	.6
	Faribault	0925,0926,0933	50	1
	Brainerd	0927	126	2.3
	Moose Lake	0928	112	2.1
	Fergus Falls	0929	179	3.2
	Cambridge	0930	44	1
	Willmar	0931	95	2
	St. Peter	0932,1313	67	1.2
	Rochester	0934	84	1.5
	Anoka	0935	25	.8
	Hastings	0936	40	1
	Bemidji	1304	225	4.3
	Northfield	1305,1328	50	1
	St. Joseph	1306	75	1.4
	Collegeville	1326	79	1.5
	Winona	1308,1327,1331	121	2.2
	Moorhead	1309,1318	234	4.5
	St. Cloud	1325	66	1.2
	Mankato	1315,1334	77	1.5
	Marshall	1329	151	3
	Fargo, N.D.	1401,1402	235	4.5
		Total	2831	55.3
			x 2	x 2
			5662 miles	110.6 hours

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Figure 3.4 Location Map of Libraries in MULS outside the Minneapolis-St. Paul area.

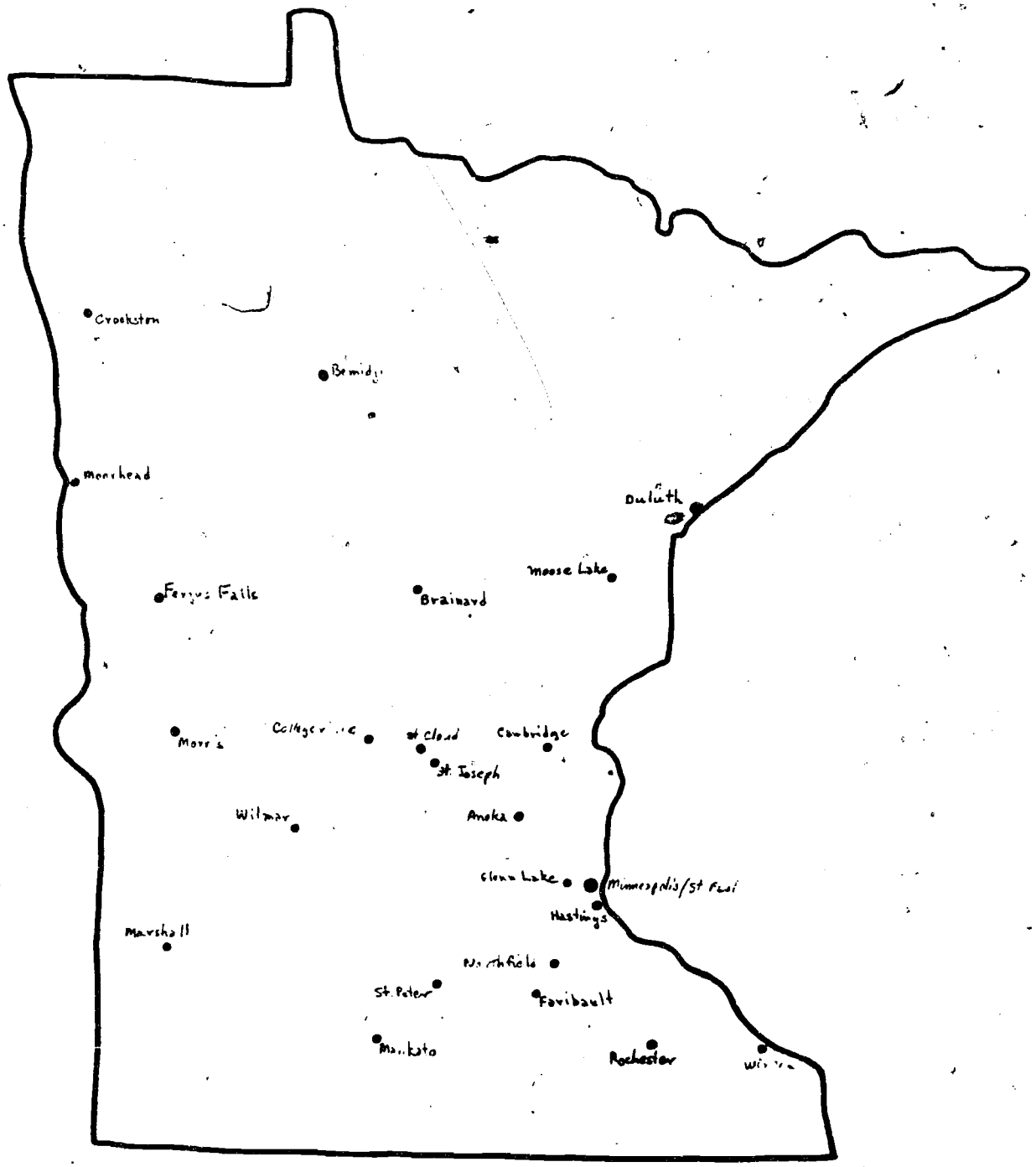

Figure 3.5. Summary Costs for Aperture Card Surrogates.

Direct Costs	Amount	Per title Dir. costs	Indirect Costs	Amount	Per title Ind. Costs
Task 1					
Finding lists	$4,250	$.08	Fringe benefits & indirect costs	$1,240	$.02
Task 2					
Selecting/ training film crew	2,280	.04	"	1,059	.02
Task 3					
Filming of title pages/mastheads					
Major sites	$15,313	.51	"	2,383	.08
Minor sites	5,943	.23	"	2,510	.10
Out-state costs	1,366	.25 (.40 ave.)	"	173	.03
Supervision costs (Non-concurrent with file data conversion)	5,625	.10	"	3,544	.07
Task 4					
Aperture card production for minor site non-automatic camera. (Service Bureau)	2,554	.10			
Task 5					
NSDP aperture card processing (estimate only)	4,319	.06			
Total Dir. Costs Tasks 1-4	$37,331	$ .67	Total Indirect Costs	$10,909	$ .20

AREA 4. USE OF NST TAPE DATA BASE

Contract Requirement

"Study and feasibility of and computer procedures for automated matching of records from the MULS file and the NST file for the purpose of transfer of ISSN and other data elements from the NST to the MULS file, and provide quantitative estimates of computer analysis and programming time required to implement the various procedures."

4.A. CONTENT OF NST TAPES

From the NST Master File Record Format Description, L.C. Version June 12, 1973 the following fields contain information of potential utility to the Minnesota Union List (MULS) data base:

002	Status code
008	Country code
009	ISSN
010	Title
030	Cross reference data
050	Title supplement, descriptive
060	Title supplement, additional

In addition from NSDP requirements the following additional fields may contain useful information:

090	Main Dewey Decimal No.
300-699	Holdings (for 3 National Libraries Codes)

The tape dump provided appears to be exactly as the data has been printed in New Serial Titles 1961-1965 or other cumulations. The NST data base content is not specifically tagged in such a way to effect good machine conversion to either a MARC or NSDP record structure. For example, the title field includes authors (corporate, personal, conference) title statement, and issuing body or place as well as publisher and beginning volumes and date if known. There is separation only of the data following the author/title information by the symbol @.

The only fields which could be used without change would be the ISSN and country code field. The country codes if not identical to MARC would have to be converted to MARC for MULS use and to ISO codes for NSDP use.

Moreover, the character set of the NST tape involves only upper case and punctuation (64 character set) which could only inadequately be handled by machine to be converted to the MARC internal character set upper/lower, diacritical set.

Therefore, it is our conclusion that machine processing of this data could only give us directly ISSN and country codes without considerable editing of the record. Even to do this would require manual comparison of the records in alphabetically sorted form in order to match the records as the only common number is the ISSN between MULS and NST. For the 55,416 titles in MULS as of July 1, 1973 our statistics show 12,978 ISSN tags--23% of the total.

The NST tape would have to be sorted in sort key sequence first if it were to be used by MULS. Then it would have to be listed on an output sheet for editors to compare to the MULS file listing. Some provision for inputting the MULS I.D. No. on an NST record together with a series of commands such as transfer ISSN, transfer Country Code, etc. would have to be provided. The other fields could not be transferred directly because of the large amount of editing needed. The direct cost of this effort would be:

Sorting NST tape (200,000 records)	6-8 hrs.	@$70 hr.	$ 560
Printing NST edit listings (200,000 records)	3-5 hrs.	@$100 hr.	350
Writing output/merging program	1 mo.	@$1,000	1000
Program debugging	1 hr.	@$100	100
Supplies			250
		TOTAL	$2260

4.B. RECOMMENDATION FOR NST DATA USAGE.

In view of the above cost together with the inadequacy of data element tagging, differing character set, and the relatively small amount of bibliographic data for each record, it is our recommendation that the NST data not be used in machine readable form by MULS. Further, it is our recommendation that when published, NST be used manually to extract any data needed to add to existing titles or build new titles data if other sources (MARC-S, NSDP, National Union Catalog) do not provide information.

It has been our experience that entries in NST can change in form when finally available as an L.C. catalog card or MARC-S record. Machine matching on the MULS sort key field and the NST sort key or title field would not produce good matches because of cataloging variations, use of punctuation and other minor differences in sort key construction between the two systems.

Appendix---Statistical Profile of the MULS Data Base of 55,416 Titles

Four hundred countries of publication are represented in the file. The major countries, no. of titles, and percentage of the file are below:

United States	29,933	54%
Canada	1,611	3%
United Kingdom	4,692	9%
West Germany	1,813	3%
East Germany	747	1%
France	2,224	4%
Scandinavian Countries	1,777	3%
USSR	675	1%
Japan	837	2%
Italy	904	2%
All others	10,203	18%
Total	55,416	100%

One hundred twenty-nine languages of publication are present. The major languages, no. of titles and percentage of the file are below:

English	42,224	76 %
German	4,521	8 %
French	3,660	7 %
Swedish	740	1.8%
Russian	640	1.1%
Japanese	529	.9%
Chinese	400	.7%
Danish	373	.6%
Norwegian	360	.6%
Czech.	141	.2%
Latin	42	
Slovak	31	
Urdu	30	.2%
Icelandic	21	
Multiple	398	.7%
All other	1,161	2 %
Total	55,416	100 %

25% of the file (13,903 titles) have L.C. card numbers and represent cataloging information from this source. 14% of the file (7945 titles) have not been verified in any known source. 23% of the file (12,978 titles) have ISSN numbers transcribed from the Bowker serials data. 51% of the file (28,591 titles) are active, with 41% or 23,230 titles no longer published. 8% are unknown as to their publication status.

Periodicals comprise 53% of the file (29,638 titles). Newspapers comprise 5% of the file (2905 titles). Monographic series comprise 3% of the file (1669 titles) All other serials comprise 39% of the file (21,183 titles). 7% of the file (3862 titles) are in other than printed physical media form. 17% of the file (9442 titles) are government publications. 2% of the file (1133 titles) are conference or meeting proceedings.

102 library locations have contributed to the total file with 59 locations at the University of Minnesota contributing 45,751 titles and the remaining 44 locations contributing the remainder of 9665 titles. This file has generated 26,372 added entry records or .5 added entries per record.

From this information, together with cost per record figures from this report it would be possible to ascertain costs for sections of the total file.

For example, there are twenty MULS libraries whose holdings are in science and technology. 23,695 titles comprise the unique holdings of these libraries or 43% of the MULS total file. Therefore, on a pro rata basis 43% of the conversion effort would be expended on science-technology related titles.

Appendix - Editorial Sample

To support the costing figures in Section 2 of the report a sample of the data base was made. A computer-generated list of random numbers was used for the sample and the reliability of the results were supported by the fact that the distribution of languages (also sampled) compared favorably to the figures generated by our computer program.

The following were the results. (A total of 344 records were checked for out of 500 numbers listed, 156 were cross references or added entries.) These 344 records broke down into the following editing requirements: 140 records required essentially no editing - that is, they merely needed to be scanned for integrity and an indication of key title needed to be made. Estimated to take about 5 minutes per record, 140 records would require 700 minutes. 136 records required a modest amount of editing - usually creation of a key title from author and title and/or handling of sponsoring bodies, etc. Estimated to take about 15 minutes per record, 2040 minutes would be needed. Twenty-three records required a moderate level of editing such as construction of a key title plus a single title split, for example. These were estimated to take about 30 minutes each or a total of 690 minutes. Twenty-seven records seemed to need a significant amount of editing, such as needing title splits where dates had to be checked or many changes in issuing body had occurred and a generic title was used. These were judged to take about one hour each for a total of 27 hours. Eighteen titles appeared to require a massive amount of editing such as requiring many title splits where no dates were given or title changes involving two or more series, etc. These seemed to warrant at least two hours each or a total of 36+ hours.

The above works out to a total of 120 hours for 344 records. If 344 is divided into the total data base of 55,416, a figure of 161 is attained. If that amount is multiplied times 120 hours, it appears that it would take about 19,320 hours to edit the entire data base. If this figure is multiplied times a $7.00/hour wage, the total cost proves to be $135,240.00.

If the approach of computer editing were applied to the first two categories, 276 records or 80% of the total would be handled in this fashion. That would leave 20% or 68 records which could best be handled by an editor. Those 68 records would require 74.5 hours of editing. If this figure is multiplied times our 161 figure, it can be seen that a total of 11,994.5 hours would be required to edit the three difficult categories within the data base. Multiplied times the $7.00/hour wage, it appears that the total revised manual effort would cost $83,961.50.